FINAL

ENVIRONMENTAL ASSESSMENT

INSTALLATION DEVELOPMENT AT LITTLE ROCK AIR FORCE BASE ARKANSAS

AIR EDUCATION AND TRAINING COMMAND

18 October 2006

Report Documentation Page

Form Approved
OMB No. 0704-0188

Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.

1. REPORT DATE	2. REPORT TYPE	3. DATES COVERED
18 OCT 2006		**00-00-2006 to 00-00-2006**

4. TITLE AND SUBTITLE	5a. CONTRACT NUMBER
Final Environmental Assessment for Installation Development at Little Rock Air Force Base Arkansas	5b. GRANT NUMBER
	5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S)	5d. PROJECT NUMBER
	5e. TASK NUMBER
	5f. WORK UNIT NUMBER
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) **Science Applications International Corporation (SAIC),2617 East 7th Street,Tucson,AZ,85716**	8. PERFORMING ORGANIZATION REPORT NUMBER
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)	10. SPONSOR/MONITOR'S ACRONYM(S)
	11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release; distribution unlimited

13. SUPPLEMENTARY NOTES

14. ABSTRACT

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT **unclassified**	b. ABSTRACT **unclassified**	c. THIS PAGE **unclassified**	**Same as Report (SAR)**	**319**	

FINAL

ACRONYMS AND ABBREVIATIONS

°F	degrees Fahrenheit
µg/m^3	micrograms per cubic meter
189 AW	189th Airlift Wing
314 AW	314th Airlift Wing
314 TAW	314th Tactical Airlift Wing
463 AG	463rd Airlift Group
463 MOS	463rd Maintenance Operations Squadron
48 AS	48th Airlift Squadron
62 AS	62nd Airlift Squadron
AADZ	All-American Drop Zone
AAFES	Army and Air Force Exchange Service
ACHP	Advisory Council on Historic Preservation
ADEQ	Arkansas Department of Environmental Quality
ADSL	average daily student load
AETC	Air Education and Training Command
AF	Air Force
AFB	Air Force Base
AFCESA	Air Force Civil Engineer Support Agency
AFI	Air Force Instruction
AFOSH	Air Force Occupational Safety and Health
AFRC	Air Force Reserve Command
AGL	above ground level
AICUZ	Air Installation Compatible Use Zone
AIRFA	American Indian Religious Freedom Act
AMC HQ	Air Mobility Command Headquarters
AMC	Air Mobility Command
AMU	Aircraft Maintenance Unit
ANG	Air National Guard
AOC	Area of Concern
AOP	Arkansas Ordnance Plan
APZ	Accident Potential Zone
ARTCC	Air Route Traffic Control Center
AST	aboveground storage tank
AT/FP	Anti-Terrorism/Force Protection
ATC	Air Traffic Control
AZ	Assault Zone
BAI	Backup Aircraft Inventory
BASH	Bird-Aircraft Strike Hazard
BBQ	barbecue
BJDZ	Black Jack Drop Zone
BMP	Best Management Practice
BRAC	Base Realignment and Closure
CAA	Clean Air Act
CADS	Combat Aerial Delivery School
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CERFA	Community Environmental Response Facilitation Act
CFR	Code of Federal Regulations
CIP	Capital Improvements Program
CO	carbon monoxide
CWA	Clean Water Act
CY	calendar year
CZ	Clear Zone
dB	decibel
dBA	A-weighted decibel
DoD	Department of Defense
DRMO	Defense Reutilization and Marketing Office
DZ	Drop Zone
EA	Environmental Assessment
EIAP	Environmental Impact Analysis Process
EIS	Environmental Impact Statement
EO	Executive Order
EPCRA	Emergency Planning and Community Right-to-Know Act
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FAMCAMP	Family Camping
FFCA	Federal Facility Compliance Act
FONPA	Finding of No Practicable Alternative
FONSI	Finding of No Significant Impact
FY	Fiscal Year
HAP	High Accident Potential
HAZMART	Hazardous Materials Pharmacy
Hz	hertz
ICRMP	Integrated Cultural Resources Management Plan
IFR	Instrument Flight Rule
IICEP	Interagency and Intergovernmental Coordination for Environmental Planning
IRP	Installation Restoration Program
JaxDZ	Jacksonville Drop Zone
L_{dn}	Day-Night Average Sound Level
L_{dnmr}	Onset Rate-Adjusted Monthly Day-Night Average Sound Level
L_{eq}	Equivalent Noise Level
$L_{eq(24)}$	24-hour Equivalent Noise Level
$L_{eq(8)}$	8-hour Equivalent Noise Level
LF	linear feet
LIT	Little Rock Approach Control
L_{max}	maximum sound level

CONTINUED ON INSIDE BACK COVER

FINDING OF NO SIGNIFICANT IMPACT FOR INSTALLATION DEVELOPMENT 314th AIRLIFT WING LITTLE ROCK AIR FORCE BASE, ARKANSAS

AGENCY: 314th Airlift Wing, Little Rock Air Force Base, Arkansas

BACKGROUND: The Proposed Action includes implementation of the Base Realignment and Closure (BRAC) Commission final recommendations, as well as other installation development at Little Rock Air Force Base (AFB). Components of the BRAC program for Little Rock AFB include: increase of full-time military population by up to 600 personnel; increase of the C-130 fleet by up to 12 aircraft; increase of night-time flying operations by up to 10 percent; and increase construction projects. Additionally, under the Proposed Action, Little Rock AFB proposes to implement their five-year Capital Improvements Program (CIP) (through 2011) in support of installation development. The components of the CIP will include new building construction and alteration, replacement of old buildings, and demolition of some existing facilities. Under this alternative, there will be approximately 720,000 square feet (SF) of construction, including new facilities and pavements. An environmental assessment (EA) was completed and is attached and incorporated by reference. It analyzed the Proposed Action, a Potential Development Alternative, and the No Action Alternative.

SUMMARY OF FINDINGS:

Direct, indirect, and cumulative impacts regarding earth resources, water resources, biological resources, air quality, airspace management and air traffic control, noise, land use and visual resources, socioeconomics and environmental justice, cultural resources, safety, infrastructure, and solid and hazardous materials and wastes were analyzed. There are no significant impacts anticipated as a result of implementation of the Proposed Action, the Alternative Action, or the No Action Alternative.

An estimated 16.4 acres will be disturbed as a result of construction and pavements activities associated with the Proposed Action, with an increase of approximately 13.4 acres of impervious surface. Best management practices (BMPs) will be implemented to ensure that erosion and impacts to water resources are minimized. Anticipated increases in emissions as a result of proposed construction and increase in assigned aircraft are not expected to result in any meaningful long-term impacts to Pulaski County or Air Quality Control Region 016. There will be a minor increase in use of the Little Rock AFB airfield and related military training airspace as a result of an increase of 12 aircraft; however this increase is not expected to result in significant impacts. Land and therefore persons located under the noise contours in the vicinity of Little Rock AFB will increase slightly; however this increase is expected to be negligible. Land use is not expected to be affected by this minor increase in acreage under the contours. An increase of 600 persons in combination with proposed construction will increase use of base infrastructure, including utilities and roadways. The projected 6 to 8 percent increase in demand of base infrastructure is not expected to create adverse

impacts. There will be some minor disruption of utilities and some roadways during construction activities; however these impacts would be temporary and no more than minor inconveniences. The Proposed Action will result in an approximately 16 percent increase in the amount of hazardous materials and petroleum products used. These will be managed in accordance with existing protocols, and impacts are expected to be minor.

The Alternative Action would potentially result in approximately 430 acres of increased impervious surface, although much of this is previously disturbed and impervious. BMPs would be implemented to ensure that erosion and impacts to water resources were minimized. Anticipated increases in emissions as a result of construction and increase in assigned aircraft under the alternative are not expected to result in any meaningful long-term impacts to Pulaski County or Air Quality Control Region 016. There would be an increase in use of the Little Rock AFB airfield and related military training airspace as a result of an increase of up to 39 aircraft; however this increase is not expected to result in significant impacts. Land and therefore persons located under the noise contours in the vicinity of Little Rock AFB would increase; however this increase would not be expected to be significant. Land use would not be expected to be affected by this increase in acreage under the contours. An increase of up to 6,916 persons in combination with proposed construction would increase use of base infrastructure, including utilities and roadways. The projected increase in demand of base infrastructure would not be expected to create adverse impacts. There would be some minor disruption of utilities and some roadways during construction activities; however these impacts would be temporary and no more than minor inconveniences. The Alternative Action would result in an approximately 50 percent increase in the amount of hazardous materials and petroleum products used. These would be managed in accordance with existing protocols, and impacts would be expected to be minor.

PUBLIC INVOLVEMENT: On August 17, 2006, a notice in the *Arkansas Democrat Gazette* invited comment on the draft EA for a period of 30 days. Responses were received from eleven agencies. The Arkansas Department of Environmental Quality indicated support for the project and indicated that projects involving construction activities would require compliance with the National Pollutant Discharge Elimination System (NPDES) stormwater program. The Little Rock District of the Corps of Engineers expressed their support of the proposed action, and had no additional specific comments to add. The Department of Arkansas Heritage indicated that there are 37 archaeological sites and 21 historic structures located on Little Rock AFB. The AFB was surveyed for archaeological sites in 1995, but an architectural survey has not been conducted. Any land that has not been previously investigated or any structures that could be eligible for the National Register of Historic Places should be surveyed prior to any construction and/or demolition activities. The Arkansas Natural Resources Commission indicated support for the project and previously recommended a wetland/stream mitigation process (avoidance, minimization, compensation) be included in all planning, evaluation, and analysis phases of the project, and that impacts be mitigated at a ratio appropriate for the site. The Arkansas Geological Commission recommended that soil testing be conducted in those areas of the Midway occurrences before any construction takes place. The Arkansas Department of Health had no comments. Arkansas Department of Game and Fish had

no additional comments. The Commissioner of State Lands Office expressed support of the project and had no further comments. The Arkansas State Highway and Department of Transportation had no comments. The U.S. Fish and Wildlife Service (USFWS) indicated that Little Rock AFB has been coordinating with the Service regarding interior least terns that have recently been observed on base. The USFWS indicated that protocols should be implemented that will minimize potential impacts to the tern. Given these protocols, the USFWS has determined that the proposed action is not likely to adversely affect the Interior Least Tern. The Natural Resources Conservation Service indicated that no Prime Farmland or Farmland of Statewide importance would be impacted. They also indicated that best management practices should be employed to reduce erosion and to protect water quality in local streams.

FINDING OF NO SIGNIFICANT IMPACT (FONSI): Based on my review of the facts and analysis in the EA, I conclude that the Proposed Action will not have a significant impact either by itself or considering cumulative impacts. Accordingly, the requirements of the National Environmental Policy Act (NEPA), the Council on Environmental Quality (CEQ) Regulations, and 32 Code of Federal Regulations (CFR) 989 have been fulfilled, and an environmental impact statement is not required and will not be prepared.

Kip Self

KIP L. SELF, Brigadier General, USAF
Chairperson, Environmental, Safety and Occupational Health Council

12 OCT 06

Date

FINAL

ENVIRONMENTAL ASSESSMENT

INSTALLATION DEVELOPMENT

AT

LITTLE ROCK AIR FORCE BASE
ARKANSAS

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1.0 PURPOSE AND NEED

1.1 PURPOSE AND NEED FOR THE PROPOSED ACTION

Little Rock Air Force Base (AFB) is the home of the 314th Airlift Wing (314 AW), and is the only C-130 training base in the Department of Defense (DoD). The 314 AW trains C-130 aircrew members from all branches of the services and 27 allied nations. Tenant units located at the base include the 463rd Airlift Group (463 AG), Mobility Weapons School (MWS) under Air Mobility Command (AMC), and the 189th Airlift Wing (189 AW) under the Air National Guard (ANG). The combined mission is to organize, equip, and train combat-ready airlift units to operate anywhere in the world.

The 314 AW at Little Rock AFB, Arkansas, proposes to implement the requirements of the Base Realignment and Closure (BRAC) program as it relates to Little Rock AFB, as well as other installation development based on the current Capital Improvements Program (CIP). Components of the BRAC program at Little Rock AFB include: increase of the on-Base population by up to 600 full-time military personnel; increase of the C-130 fleet by up to twelve aircraft; and increase of night-time flying operations by 10 percent. Additionally, Little Rock AFB proposes to implement their CIP in support of installation development. The components of the CIP would include new building construction and alteration, replacement of old buildings, and demolition of some existing facilities. The Base's ability to maintain heavily used and outdated facilities has been exacerbated by recent BRAC actions which would result in increased activities at Little Rock AFB. The purpose of this action is to upgrade, replace, or supplement facilities that have been in place over several years and are no longer efficient or adequate to serve their original intended functions.

In accordance with the National Environmental Policy Act (NEPA) of 1969 (42 United States Code [USC] 4321-4347), Council on Environmental Quality (CEQ) Regulations for Implementing the Procedural Provisions of NEPA (40 Code of Federal Regulations [CFR] §§ 1500-1508), and 32 CFR 989, *Environmental Impact Analysis Process*, the 314 AW is preparing an Environmental Assessment (EA) that will consider the potential consequences to the human and natural environment that may result from the proposed installation development. Air Force Instruction (AFI) 32-7061 addresses United States Air Force (USAF) implementation of NEPA and directs USAF officials to consider the environmental consequences of any proposal as part of the decision making process.

The Proposed Action is necessary because there are currently shortfalls in availability of adequate facilities at Little Rock AFB. The Proposed Action would provide the necessary facilities to efficiently accomplish the continuously evolving mission of the 314 AW.

1.2 LOCATION OF THE PROPOSED ACTION

Little Rock AFB is a USAF training installation under the Air Education and Training Command (AETC). The installation comprises 6,128 acres and is located approximately 15 miles north of the city of Little Rock in central Arkansas (Figure 1.2-1). The base lies in Pulaski County, in the town of Jacksonville. Figure 1.2-2 shows the general layout of Little Rock AFB. United States (U.S.) Route 67/167 borders Little Rock AFB on the eastern boundary and State Route 107 borders the base on the western boundary. Vandenberg Boulevard is the main access to Little Rock AFB.

1.3 DECISION TO BE MADE

The decision to be made by the USAF is whether to select the Proposed Action, under which the components of the BRAC program and additional CIP program would be implemented, as described in Section 2.4; or to select the Alternative Action, under which Base-wide development could occur as described in Section 2.5. The No Action Alternative is also considered under this review. The decision-maker for this action is the Environmental, Safety, and Occupational Health Council Chairperson at Little Rock AFB.

1.4 SCOPE OF THE ENVIRONMENTAL REVIEW

This EA identifies, describes, and evaluates the potential environmental impacts that may result from implementation of the BRAC program and the CIP (the Proposed Action), implementation of the Base-wide potential development alternative (the Alternative Action), and the No Action Alternative. As appropriate, the affected environment and environmental consequences of the Proposed Action and alternatives may be described in terms of site-specific descriptions or regional overview. Finally, the EA identifies measures that would prevent or minimize environmental impacts.

The resources that could be impacted and will thereby be analyzed in the EA include: earth resources, water resources, biological resources, air quality, airspace management and air traffic control, noise, land use and visual resources, socioeconomics and environmental justice, cultural resources, safety, infrastructure, and solid and hazardous materials and wastes.

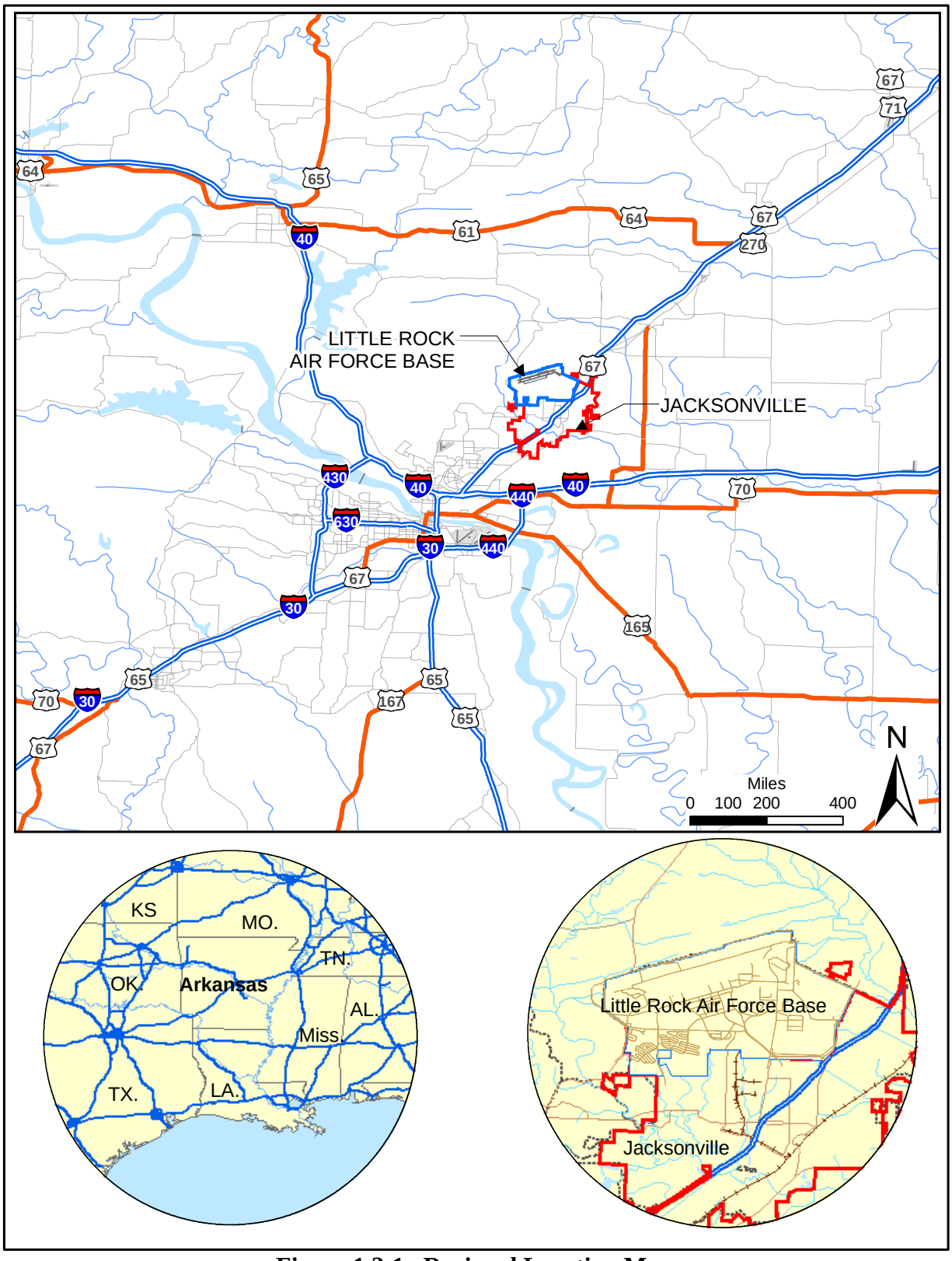


Figure 1.2-1. Regional Location Map
Little Rock AFB, Arkansas

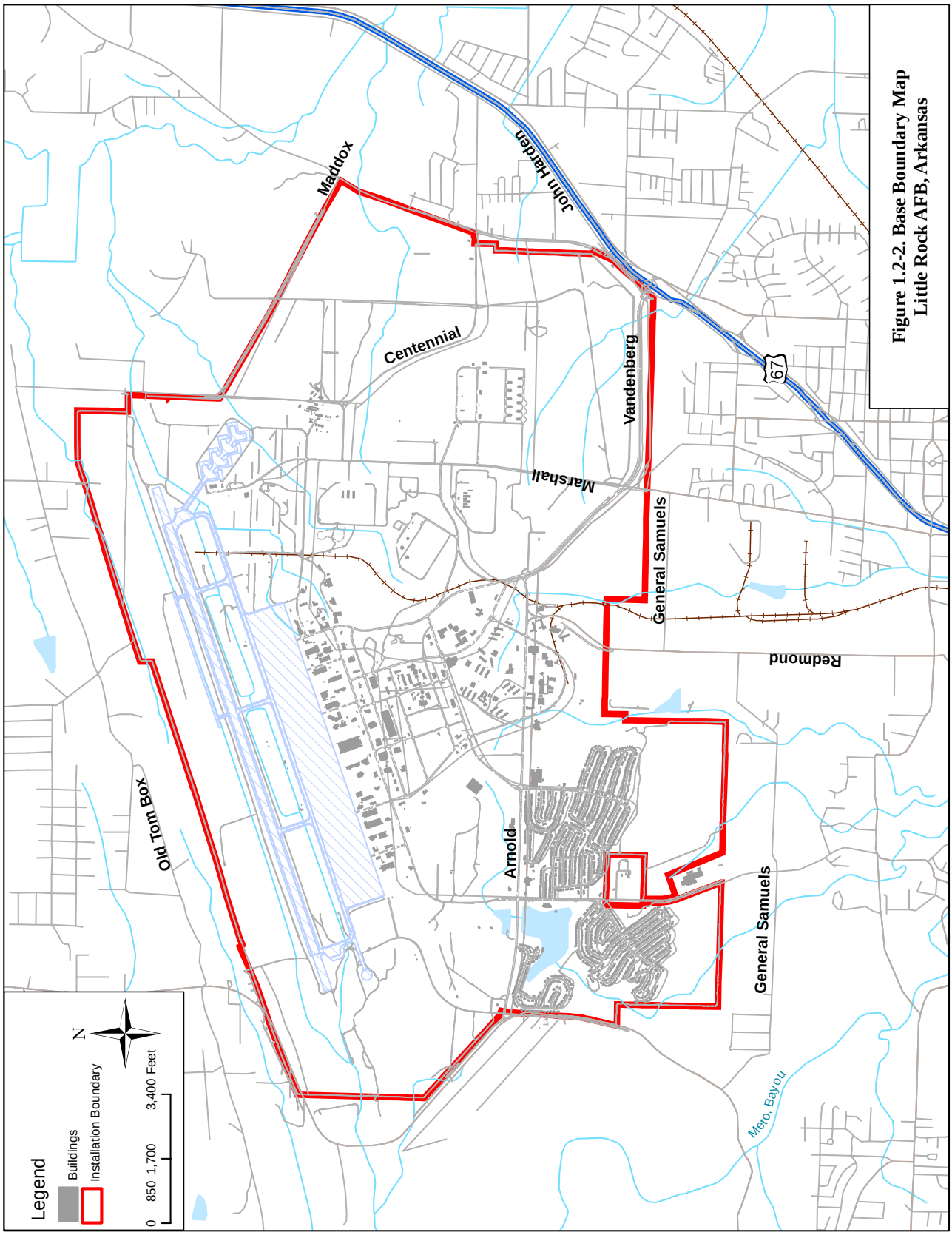


Figure 1.2-2. Base Boundary Map
Little Rock AFB, Arkansas

Executive Order (EO) 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, was issued by the President on February 11, 1994. In the EO, the President instructed each Federal Agency to make "achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations." The Federal Interagency Working Group on Environmental Justice defines 'adverse' as "having deleterious effects on human health or the environment that is significant, unacceptable, or above generally accepted norms."

1.5 APPLICABLE REGULATORY REQUIREMENTS

1.5.1 NATIONAL ENVIRONMENTAL POLICY ACT

NEPA requires federal agencies to take into consideration the potential environmental consequences of proposed actions in their decision-making process. The intent of NEPA is to protect, restore, and enhance the environment through well-informed federal decisions. The CEQ was established under NEPA to implement and oversee federal policy in this process. The CEQ subsequently issued the Regulations for Implementing the Procedural Provisions of NEPA (40 CFR Sections 1500–1508) (CEQ 1978). These requirements specify that an EA be prepared to:

- Briefly provide sufficient evidence and analysis for determining whether to prepare an Environmental Impact Statement (EIS) or a Finding of No Significant Impact (FONSI).
- Aid in an agency's compliance with NEPA when an EIS is not necessary.
- Facilitate preparation of an EIS when one is necessary.

The activities that are addressed within this EA constitute a federal action and therefore must be assessed in accordance with NEPA. To comply with NEPA, as well as other pertinent environmental requirements, the decision-making process for the Proposed Action includes the development of an EA to address the environmental issues related to the proposed activities. The USAF implementing procedures for NEPA are contained in AFI 32-7061, *Environmental Impact Analysis Process* (32 CFR 989 *et seq.*).

1.5.2 ENDANGERED SPECIES ACT

The Endangered Species Act (ESA) of 1973 (16 USC §§ 1531–1544, as amended) established measures for the protection of plant and animal species that are federally listed as threatened and endangered, and for the conservation of habitats that are critical to the continued existence of

those species. Federal agencies must evaluate the effects of their proposed actions through a set of defined procedures, which can include the preparation of a Biological Assessment and can require formal consultation with the United States Fish and Wildlife Service (USFWS) under Section 7 of the Act.

1.5.3 CLEAN AIR ACT

The Clean Air Act (CAA) (42 USC §§ 7401–7671, as amended) provided the authority for the United States Environmental Protection Agency (USEPA) to establish nationwide air quality standards to protect public health and welfare. Federal standards, known as the National Ambient Air Quality Standards (NAAQS), were developed for six criteria pollutants: ozone (O_3), nitrogen dioxide (NO_2), carbon monoxide (CO), sulfur dioxide (SO_2), particulate matter, and lead (Pb). The Act also requires that each state prepare a State Implementation Plan (SIP) for maintaining and improving air quality and eliminating violations of the NAAQS. Under the CAA Amendments of 1990, federal agencies are required to determine whether their undertakings are in conformance with the applicable SIP and demonstrate that their actions will not cause or contribute to a new violation of the NAAQS; increase the frequency or severity of any existing violation; or delay timely attainment of any standard, emission reduction, or milestone contained in the SIP.

1.5.4 WATER RESOURCES REGULATORY REQUIREMENTS

The Clean Water Act (CWA) of 1977 (33 USC § 1251 *et seq*.) regulates pollutant discharges that could affect aquatic life forms or human health and safety. Section 404 of the CWA, and EO 11990, *Protection of Wetlands*, regulate development activities in or near streams or wetlands. Section 404 regulates development in streams and wetlands and requires a permit from the United States Army Corps of Engineers (USACE) for dredging and filling in wetlands. EO 11988, *Floodplain Management*, requires federal agencies to take action to reduce the risk of flood damage; minimize the impacts of floods on human safety, health, and welfare; and to restore and preserve the natural and beneficial values served by floodplains. Federal agencies are directed to consider the proximity of their actions to or within floodplains.

1.5.5 CULTURAL RESOURCES REGULATORY REQUIREMENTS

The National Historic Preservation Act (NHPA) of 1966 (16 USC § 470) established the National Register of Historic Places (NRHP) and the Advisory Council on Historic Preservation (ACHP), outlining procedures for the management of cultural resources on federal property. Cultural resources can include archaeological remains, architectural structures, and traditional cultural properties such as ancestral settlements, historic trails, and places where significant historic events occurred. The Act requires federal agencies to consider potential impacts to

cultural resources that are listed, nominated to, or eligible for listing on the NRHP; designated a National Historic Landmark; or valued by modern Native Americans for maintaining their traditional culture. Section 106 of the act requires federal agencies to consult with State Historic Preservation Officers (SHPO) if their undertakings might affect such resources. *Protection of Historic and Cultural Properties* (36 CFR 800 [1986]) provides an explicit set of procedures for federal agencies to meet their obligations under the NHPA, including inventorying of resources and consultation with SHPO.

The American Indian Religious Freedom Act (AIRFA) (42 USC § 1996) established federal policy to protect and preserve the rights of Native Americans to believe, express, and exercise their traditional religions, including providing access to sacred sites. The Native American Graves Protection and Repatriation Act (NAGPRA) (25 USC §§ 3001–3013) requires consultation with Native American tribes prior to excavation or removal of human remains and certain objects of cultural importance.

1.5.6 OTHER REGULATORY REQUIREMENTS

Additional regulatory legislation that potentially applies to the implementation of this proposal includes guidelines promulgated by EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, to ensure that citizens in either of these categories are not disproportionately affected. EO 13186, *Responsibilities of Federal Agencies to Protect Migratory Birds*, requires federal agencies to evaluate the effects of actions on migratory birds with an emphasis on species of concern.

1.5.7 ENVIRONMENTAL COORDINATION

EO 12372, *Intergovernmental Review of Federal Programs*, requires intergovernmental notifications prior to making any detailed statement of environmental impacts. Through the process of Interagency and Intergovernmental Coordination for Environmental Planning (IICEP), the proponent must notify concerned federal, state, and local agencies and allow them sufficient time to evaluate potential environmental impacts of a proposed action. Comments from these agencies are subsequently incorporated into the Environmental Impact Analysis Process (EIAP).

In a recently formulated policy to address EO 13084, *Consultation and Coordination with Indian Tribal Governments*, the DoD has clarified its policy for interacting and working with federally recognized American Indian and Alaska Native governments. Under this policy guidance, proponents must provide timely notice to, and consult with, tribal governments prior to taking any actions that have the potential to affect protected tribal resources, tribal rights, or Indian lands. Tribal input must be solicited early enough in the planning process that it may influence the decision to be made.

1.5.8 SPECIAL OPERATING PROCEDURES

This section identifies procedures identified during the preparation of this analysis that must be completed by knowledgeable, responsible personnel from the 314 AW, working through the appropriate federal, state, and local agencies.

- Construction Best Management Practices (BMPs) would be employed during construction activities to minimize soil movement, stabilize runoff, and generally control sedimentation. These BMPs would include, but not be limited to: the development of a project specific Storm Water Pollution Prevention Plan (SWPPP); regular and documented site inspections; the use of well maintained silt fences; minimizing surficial area disturbed at any given moment; stabilization of cut/fill slopes; minimization of earth-moving activities during wet weather; use of temporary detention ponds; and rapid re-vegetation.

- The 314 AW would obtain any required permits, approvals, or certifications prior to implementing construction or demolition activities.

- The 314 AW would obtain a National Pollutant Discharge Elimination System (NPDES) Construction Storm Water Permit from the NPDES Branch of the Water Division of the Arkansas Department of Environmental Quality (ADEQ). The Little Rock AFB SWPPP would also be updated at this time.

- No construction involving wetlands or floodplains would occur without prior coordination with ADEQ, USACE Little Rock District Office, and without obtaining a Finding of No Practicable Alternative (FONPA) from the USAF.

- Personnel conducting construction and/or demolition activities would strictly adhere to all applicable occupational safety requirements during construction activities.

- Coordination with SHPO and interested tribes would occur prior to construction and/or demolition activities, as appropriate.

- If necessary, sampling for asbestos and lead-based paint would occur prior to demolition of any facilities on Little Rock AFB, and materials would be handled in accordance with USAF policy.

- Contaminated soils associated with Installation Restoration Program (IRP) sites would be removed and disposed of per applicable regulations, as determined necessary.

1.6 INTRODUCTION TO THE ORGANIZATION OF THE DOCUMENT

This EA is organized into seven chapters. Chapter 1.0 contains a statement of the purpose and need for the action, and the location of the Proposed Action. It also provides a summary of the scope of the environmental review, the decision to be made, identification of applicable regulatory requirements, and a description of the organization of the EA.

Chapter 2.0 contains a brief introduction, describes the history of the formulation of alternatives, describes the alternatives eliminated from further consideration, provides a detailed description of the Proposed Action, describes the No Action and other action alternatives, summarizes other actions anticipated in the region of influence (ROI), and provides a comparison matrix of environmental effects for all alternatives. This chapter also identifies the preferred alternative, and discusses mitigation or BMPs, as required.

Chapter 3.0 contains a general description of the current conditions of the resources that could be affected by the Proposed Action. Chapter 4.0 is an analysis of the environmental consequences of the Proposed Action, the action alternative, and the No Action Alternative. Chapter 5.0 lists the preparers of this document. Chapter 6.0 lists persons and agencies consulted in the preparation of this EA. Chapter 7.0 is a list of source documents relevant to the preparation of this EA. Appendix A contains all interagency correspondence regarding the Proposed Action. Appendix B contains the Capability Analysis from which the Alternative Action has been based. Appendix C presents additional information on noise analysis.

1.7 PUBLIC INVOLVEMENT

On August 17, 2006, a notice in the *Arkansas Democrat Gazette* invited comment on the draft EA for a period of 30 days. Responses were received from eleven agencies. The ADEQ indicated support for the project and indicated that projects involving construction activities would require compliance with the NPDES stormwater program. The Little Rock District of the USACE expressed their support of the proposed action, and had no additional specific comments to add. The Department of Arkansas Heritage indicated that there are 37 archaeological sites and 21 historic structures located on Little Rock AFB. The AFB was surveyed for archaeological sites in 1995, but an architectural survey has not been conducted. Any land that has not been previously investigated or any structures that could be eligible for the NRHP should be surveyed prior to any construction and/or demolition activities. The Arkansas Natural Resources Commission indicated support for the project and previously recommended a wetland/stream mitigation process (avoidance, minimization, compensation) be included in all planning, evaluation, and analysis phases of the project, and that impacts be mitigated at a ratio appropriate for the site. The Arkansas Geological Commission recommended that soil testing be conducted in those areas of the Midway occurrences before any construction takes place. The Arkansas

Department of Health had no comments. Arkansas Department of Game and Fish had no additional comments. The Commissioner of State Lands Office expressed support of the project and had no further comments. The Arkansas State Highway and Department of Transportation had no comments. The USFWS indicated that Little Rock AFB has been coordinating with the Service regarding interior least terns that have recently been observed on base. The USFWS indicated that protocols should be implemented that will minimize potential impacts to the tern. Given these protocols, the USFWS has determined that the proposed action is not likely to adversely affect the Interior Least Tern. The Natural Resources Conservation Service indicated that no Prime Farmland or Farmland of Statewide importance would be impacted. They also indicated that BMPs should be employed to reduce erosion and to protect water quality in local streams.

2.0 DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

2.1 INTRODUCTION

The 314 AW at Little Rock AFB Arkansas is considering implementing the requirements of the BRAC program as well as other installation development based on the current CIP. This development would improve the effectiveness of training, enhance quality of life, replace old inadequate facilities, correct current deficiencies, and accommodate new mission activities. Because present war time demands are so dynamic, greater numbers of trained aircrews are needed, which could increase requirements at Little Rock AFB.

As discussed in Section 1.1, Purpose and Need for the Proposed Action, this EA evaluates the potential environmental impacts of various operational alternatives at Little Rock AFB ranging from continuation of current activity levels (no action) through the full development of the installation to support an identified maximum sustainable mission activity level. The Proposed Action is to implement the BRAC program at Little Rock AFB, in addition to the CIP, as well as demolition in support of the CIP. The alternative to this proposal is to maximize development at Little Rock AFB to an identified maximum capacity of the installation, increasing the population to a maximum sustainable level, and increasing the number of aircraft assigned to Little Rock AFB to a maximum sustainable level. Finally, the No Action Alternative will also be evaluated.

2.2 HISTORY OF THE FORMULATION OF ALTERNATIVES

The alternatives that have been developed for the Proposed Action at Little Rock AFB capture the range of increase in possible development and activity levels at Little Rock AFB, from the No Action Alternative to the identified Potential Development Alternative. The Potential Development Alternative was derived from the Capability Analysis (Appendix B) which projected an expansion of the current mission activity level at the identified sustainable level, or the perceived capacity of Little Rock AFB.

Based on project requirements and the Capability Analysis, three alternatives were identified:

- Proposed Action – Implement the BRAC program as it relates to Little Rock AFB; implement construction to accomplish the CIP; demolition of facilities that are either dilapidated or in the footprint of proposed CIP construction.

- Potential Development Alternative – Develop facilities to the maximum capability of the installation and conduct technical and flying operations at identified maximum sustainable levels.

- No Action Alternative – Construct no new facilities at Little Rock AFB, and continue technical training and aircraft operations at the same level as is currently occurring.

2.3 IDENTIFICATION OF ALTERNATIVES ELIMINATED FROM FURTHER CONSIDERATION

No additional alternatives were considered given that the three alternatives identified provide the full range of potential impacts from no development (the No Action Alternative) to the Potential Development of Little Rock AFB (the Alternative Action).

2.4 PROPOSED ACTION (PREFERRED ALTERNATIVE)

Under the Proposed Action, the 314 AW at Little Rock AFB Arkansas proposes to implement the requirements of the BRAC program as it relates to Little Rock AFB, as well as other installation development based on the current CIP. Components of the BRAC program at Little Rock AFB include: increase of the on-Base population by up to 600 full-time military personnel; increase of the C-130 fleet by up to twelve aircraft; and increase of night-time flying operations by 10 percent. Additionally, Little Rock AFB proposes to implement their CIP in support of installation development. The components of the CIP would include new building construction and alteration, replacement of old buildings, and demolition of some existing facilities.

2.4.1 BRAC PROGRAM

2.4.1.1 Increase of Personnel

Under the 2005 BRAC program, Little Rock AFB would receive an additional 600 full-time military personnel in support of their expanded mission. The current military population would increase from 13,466 to 14,066. This would be an increase of 4.5 percent to the on-Base population. It is anticipated that 73 percent of these individuals would live off-Base; therefore, 438 of these individuals would live off-Base.

2.4.1.2 Increase of Twelve C-130 Aircraft

As a result of the 2005 BRAC program, Little Rock AFB would receive up to an additional twelve C-130 aircraft from various other installations. The current C-130 fleet includes three different C-130 models, including the C-130E, C-130H, and the C-130J. There are currently 75 C-130 primary aircraft inventory (PAI), and 10 backup aircraft inventory (BAI). The additional twelve C-130 aircraft would bring this total up to 87 PAI (the number of BAI [10] would remain unchanged), which would represent a 16 percent increase. There would be a corresponding increase in use of the airfield and existing airspace as a result of this increase in PAI.

Under current forecasts, it is anticipated that four of these aircraft would be assigned to the 463 AG, and eight additional aircraft would be assigned to the 314 AW. The 463 AG is an element of AMC, which supports both operational airlift missions, and training for assigned aircrews. The 314 AW is part of AETC, and provides training for C-130 aircrews. Table 2.4-1 reflects the increase in flight operations that would result from the implementation of this proposal.

Table 2.4-1. Increase In Annual Flight Operations

Airspace Type	***Airspace Designation***	***Current***	***Proposed***	***Increase***
Little Rock AFB	Airfield	117,272	136,036	18,764
Training Routes	SR-219A	436	506	70
	SR-219B	563	653	90
	SR-220A	1,989	2,307	318
	SR-220B	2,871	3,330	459
	SR-229A	93	108	15
	SR-229B	163	189	26
	SR-230A	40	46	6
	SR-230C	15	17	2
	SR-231A	78	90	12
	SR-231B	146	169	23
	SR-232A	1,393	1,616	223
	SR-232B	1,851	2,147	296
	SR-246A	231	268	37
	SR-246B	296	343	47
Drop Zones	AADZ	4,274	4,958	684
	BJDZ	5,889	6,831	942

Notes: SR = Slow-speed Training Route; AADZ = All American Drop Zone;
BJDZ = Black Jack Drop Zone

2.4.1.3 Increase in Night-Time Flying Operations

As a result of the Proposed Action, there would be an increase in night-time (noise night) flying operations at Little Rock AFB. Noise night flying operations are those that are conducted between the hours of 10:00 p.m. and 7:00 a.m. Currently 15 percent of the total flying operations at Little Rock AFB occur during "noise night." As military operations evolve, night-time operations have become increasingly important and therefore night-time training

requirements have increased over time. An increase of 10 percent in night-time operations will be evaluated as a component of this alternative.

2.4.2 CAPITAL IMPROVEMENTS PROGRAM

Under the Proposed Action, the 314 AW would implement construction projects associated with their CIP. The Little Rock AFB CIP is summarized in Table 2.4-2 (major and minor construction projects, and pavement projects). These are all programmed projects that have identified locations. Locations of all proposed projects are presented in three figures for easier viewing (Figures 2.4-1; 2.4-2; 2.4-3).

2.4.3 DEMOLITION OF FACILITIES

Under the Proposed Action, some facilities would be demolished that are either aging, inadequate, or in the footprint of proposed CIP construction. Table 2.4-3 summarizes those facilities that would be demolished under the Proposed Action, and Figure 2.4-4 identifies the location of the proposed demolitions.

2.5 POTENTIAL DEVELOPMENT (ALTERNATIVE ACTION)

Under this alternative, a potential capability of Little Rock AFB was identified. The supportable population at Little Rock AFB is based on housing capability at the Base. To support mission expansion at Little Rock AFB, this alternative considers the net acreage available for development in each land use category (generally excluding parcels smaller than 3 acres) that is free of any physical and/or operational constraints (i.e., Quantity Distance arcs, wetlands, floodplains, IRP sites). The analysis also examines the Base's ability to provide basic infrastructure support to the expanded population and facilities under this alternative. Capability in terms of airspace head-room is also considered to the extent that it may limit growth in the flying training mission. Additionally, limitations with regard to the noise environment surrounding the Little Rock AFB airfield, as well as the training airspace, are evaluated to determine any limitations with regard to the increase in use of these airspace parcels as a result of this alternative.

Table 2.4-2. Capital Improvements Program Construction
(Page 1 of 3)

Map	*Project No.*	*Project Description*	*Scope (SF)*	*Future Land Use Area*
2.4-1	NKAK031011	Construct C-130J Parachute Drying Tower	1,864	Airfield Operations
2.4-1	NKAK031064	Construct C-130J Battery Shop	302	Airfield Operations
2.4-1	NKAK031037	Construct Apron Drawdown Wells	0[1]	Airfield
2.4-1	NKAK0410541	Construct WARFIT Restrooms	400	Outdoor Recreation
2.4-1	NKAK943008	Construct HAZMART Complex	3,102	Industrial
2.4-1	NKAK951024	Construct Library Addition	3,000	Community Service
2.4-1	NKAK951030A	Construct Automated Vehicle Wash Rack	400	Industrial
2.4-1	NKAK971022	Construct Airmen Leadership School Addition	1,680	Training
2.4-1	NKAK043001	Construct Aircrew Water Survival Training Facility	26,042	Community Commercial
2.4-1	NKAK113000	Construct Security Forces Operations Facility	22,930	Administrative
2.4-1	NKAK013001	Addition/Alteration Family Support Center	12,009	Administrative
2.4-1	NKAK971064B1	Addition/Alteration Technical/Training Facility	400	Airfield Operations
2.4-1	NKAK975004	Addition Youth Center	1,030	Community Commercial
2.4-1	NKAK021094A	Addition Recruiting Squadron Facility	1,475	Training
2.4-1	NKAK032003	Construct Security Forces Mobility Warehouse	3,000	Airfield Operations
2.4-1	NKAK031074A	Addition Test Cell Facility	860	Industrial
2.4-1	NKAK051054B	Addition PMEL	823	Administrative
2.4-1	NKAK011004	Construct Latrines	200	Airfield Operations
2.4-1	NKAK985005	Construct Golf Course Maintenance Equipment Facility	4,200	Outdoor Recreation
2.4-1	NKAK035001	Construct AAFES Shopping Center Mall	122,000	Outdoor Recreation
2.4-1	*NKAK073016	Construct C-130J Squadron Operations/AMU	42,741	Airfield Operations
2.4-1	*NKAK073015	Construct C-130J Corrosion Control Hangar (1-bay)	26,552	Airfield Operations
2.4-1	*NKAK073013	Construct C-130J Flight Simulator Facility (1-bay)	9,149	Administrative
2.4-1	*NKAK073014	Construct AMC HQ Wing Facility	19,998	Administrative
2.4-1	*NKAK083009	Construct C-130 Maintenance Facility	6,555	Airfield Operations
2.4-1	*NKAK083005	Addition Survival Equipment Shop	398	Industrial
2.4-1	*NKAK061018	Addition 62 AS Mobility Equipment Storage	2,034	Airfield Operations
2.4-1	*NKAK083006	Addition Supply Warehouse	3,466	Industrial

Table 2.4-2. Capital Improvements Program Construction
(Page 2 of 3)

Map	*Project No.*	*Project Description*	*Scope (SF)*	*Future Land Use Area*
2.4-1	*NKAK061058	Construct Maintenance Training Facility/Integrated Cockpit System Trainer	1,300	Training
2.4-1	*NKAK063010	Construct Manhole Duct Section for Communication Infrastructure	10,500 LF[1]	Multiple
2.4-2	NKAK051070A	Construct Youth Center Storage	1,045	Community Commercial
2.4-2	NKAK001081	Construct Pavilion	144	Airfield Operations
2.4-2	NKAK001087	Construct Storage Building	160	Clear Zone
2.4-2	NKAK0010885	Construct Field Support Building	160	Unaccompanied Housing
2.4-2	NKAK001091	Construct Storage Building	360	Administrative
2.4-2	NKAK031065	Construct 463 MOS Pavilion	300	Training
2.4-2	NKAK0410121	Construct Storage Shed 62 Squadron Operations	320	Airfield Operations
2.4-2	NKAK051043	Construct Pavilion	816	Training
2.4-2	NKAK971007	Construct Storage Facility	360	Airfield Operations
2.4-2	NKAK981042	Construct MXS Pavilion	320	Industrial
2.4-2	NKAK991038	Construct 1700 Area BBQ Grill Pad	600	Industrial
2.4-2	NKAK031066F	C130J Construct 48 AS Pavilion	800	Airfield Operations
2.4-2	NKAK991052	Construct Pavilion	1,206	Airfield Operations
2.4-2	NKAK991088	Construct Pavilion	320	Airfield Operations
2.4-2	NKAK001056	Construct Pavilion	320	Airfield Operations
2.4-2	NKAK011022	Construct Pavilion	320	Training
2.4-2	NKAK001077	Construct Pavilion	320	Airfield Operations
2.4-2	NKAK001053	Construct Pavilion	672	Unaccompanied Housing
2.4-2	NKAK001054	Construct Pavilion	480	Airfield Operations
2.4-2	NKAK031020	Construct Gazebo	320	Administrative
2.4-3	NKAK001088	Construct Concrete Slabs	400	Outdoor Recreation
2.4-3	NKAK0010881	Construct Concrete Slab/Sunscreen	400	Outdoor Recreation
2.4-3	NKAK0010882	Construct Concrete Slab/Sunscreen	400	Outdoor Recreation
2.4-3	NKAK0010883	Construct Concrete Slab/Sunscreen	400	Outdoor Recreation
2.4-3	NKAK011047	Construct Parking Lot at Altitude Chamber	7,080	Training
2.4-3	NKAK021020	Construct Parking Lot	2,618	Unaccompanied Housing
2.4-3	NKAK021054	Expand Recruiting Squadron Parking Lot	5,000	Training
2.4-3	NKAK031041	Pave Perimeter Road Near Taxiways H and I	10,000	Clear Zone

Table 2.4-2. Capital Improvements Program Construction
(Page 3 of 3)

Map	*Project No.*	*Project Description*	*Scope (SF)*	*Future Land Use Area*
2.4-3	NKAK061038B	Expand Dorm Parking Lot	7,080	Unaccompanied Housing
2.4-3	NKAK891114	Construct Driveway at Visitors Quarters	11,000	Unaccompanied Housing
2.4-3	NKAK901022	Construct Parking Lot at DRMO	7,080	Industrial
2.4-3	NKAK961040	Construct Parking Lot	18,000	Airfield Operations
2.4-3	NKAK971025	Construct Parking Lot	14,160	Industrial
2.4-3	NKAK981002	Construct POV Parking Lot at Communications Squadron	7,080	Community Service
2.4-3	NKAK981069B	Expand CADS Parking Lot and Canopies	5,376	Airfield Operations
2.4-3	NKAK951111	Construct Contractor Staging Road	25,000	Industrial
2.4-3	NKAK001023	Construct Parking Lot	60,990	Airfield Operations
2.4-3	NKAK051077	Construct Sidewalks on Arnold Drive	13,842	Accompanied Housing
2.4-3	NKAK0510771	Construct Sidewalks on Arnold Drive	4,880	Accompanied Housing
2.4-3	NKAK961042	Pave Shoulders of the Test Cell Road	3,000	Industrial
2.4-3	NKAK031040	Construct Parking Lot	7,080	Administrative
2.4-3	NKAK035007	Pave FAMCAMP Road	12,500	Outdoor Recreation
2.4-3	NKAK031076	Construct Campus Area Parking Lot	79,698	Training
2.4-3	NKAK961043	Construct Motor Pool Parking Lot	7,080	Industrial
2.4-3	NKAK021073	Construct Acceleration/Deceleration Lanes	6,000	Administrative
2.4-3	*NKAK073011	Construct West Flightline Area Parking Lot	78,750	Industrial
	Total		**715,947**	**16.4 acres**

Note: 1. Because this project would have no surface footprint, it is not included in the total square footage.
*Indicates project is related to BRAC.

WARFIT = War Fitness; HAZMART = Hazardous Materials Pharmacy; PMEL = Precision Measurement Equipment Laboratory; AAFES = Army and Air Force Exchange Service; AMU = Aircraft Maintenance Unit; AMC HQ = Air Mobility Command Headquarters; 62 AS = 62nd Airlift Squadron; 463 MOS = 463rd Maintenance Operations Squadron; MXS = Maintenance Squadron; BBQ = Barbecue; 48 AS = 48th Airlift Squadron; DRMO = Defense Reutilization and Marketing Office; POV = privately-owned vehicle; CADS = Combat Aerial Delivery School; FAMCAMP = Family Camping; SF = square foot; LF = linear foot

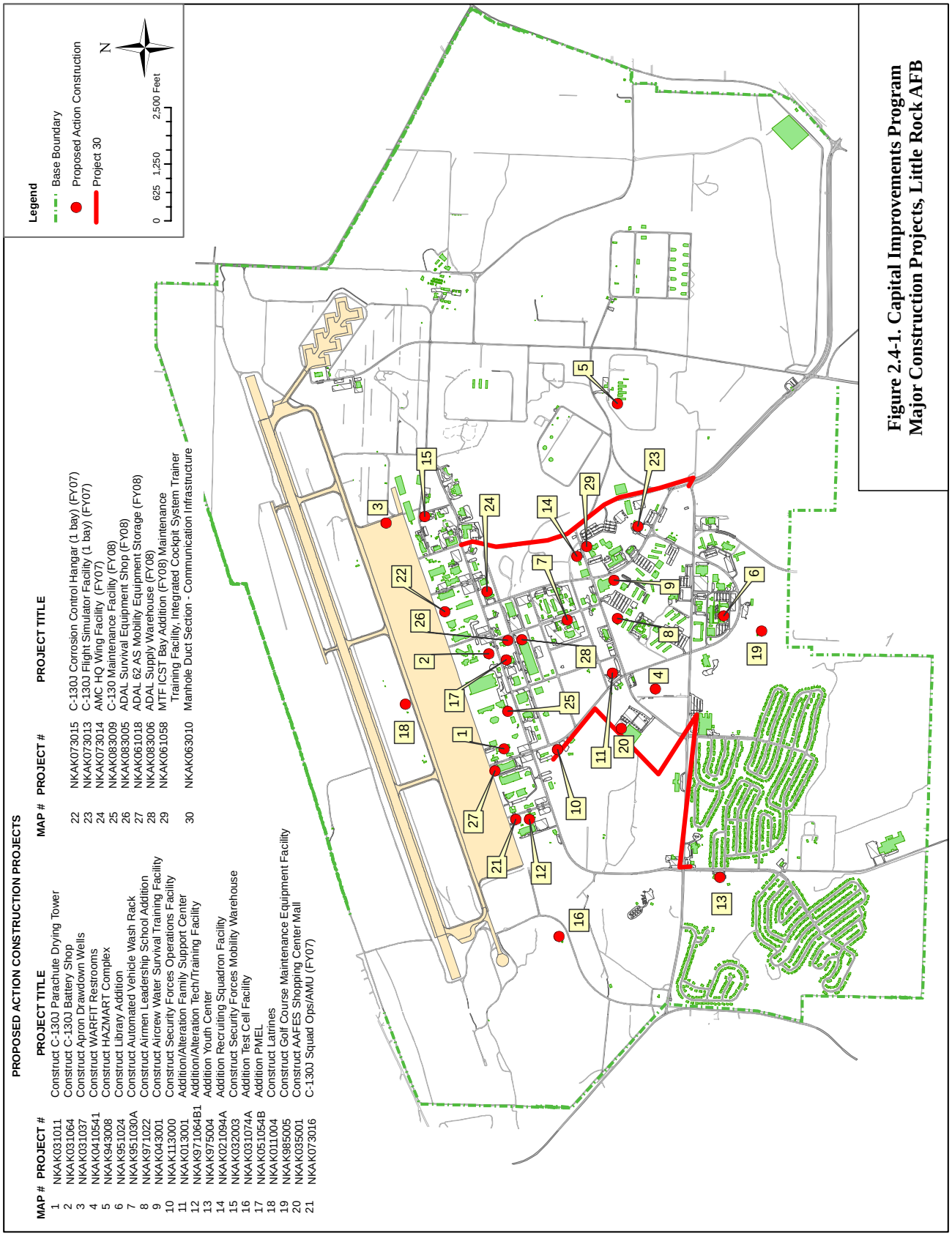


Figure 2.4-1. Capital Improvements Program Major Construction Projects, Little Rock AFB

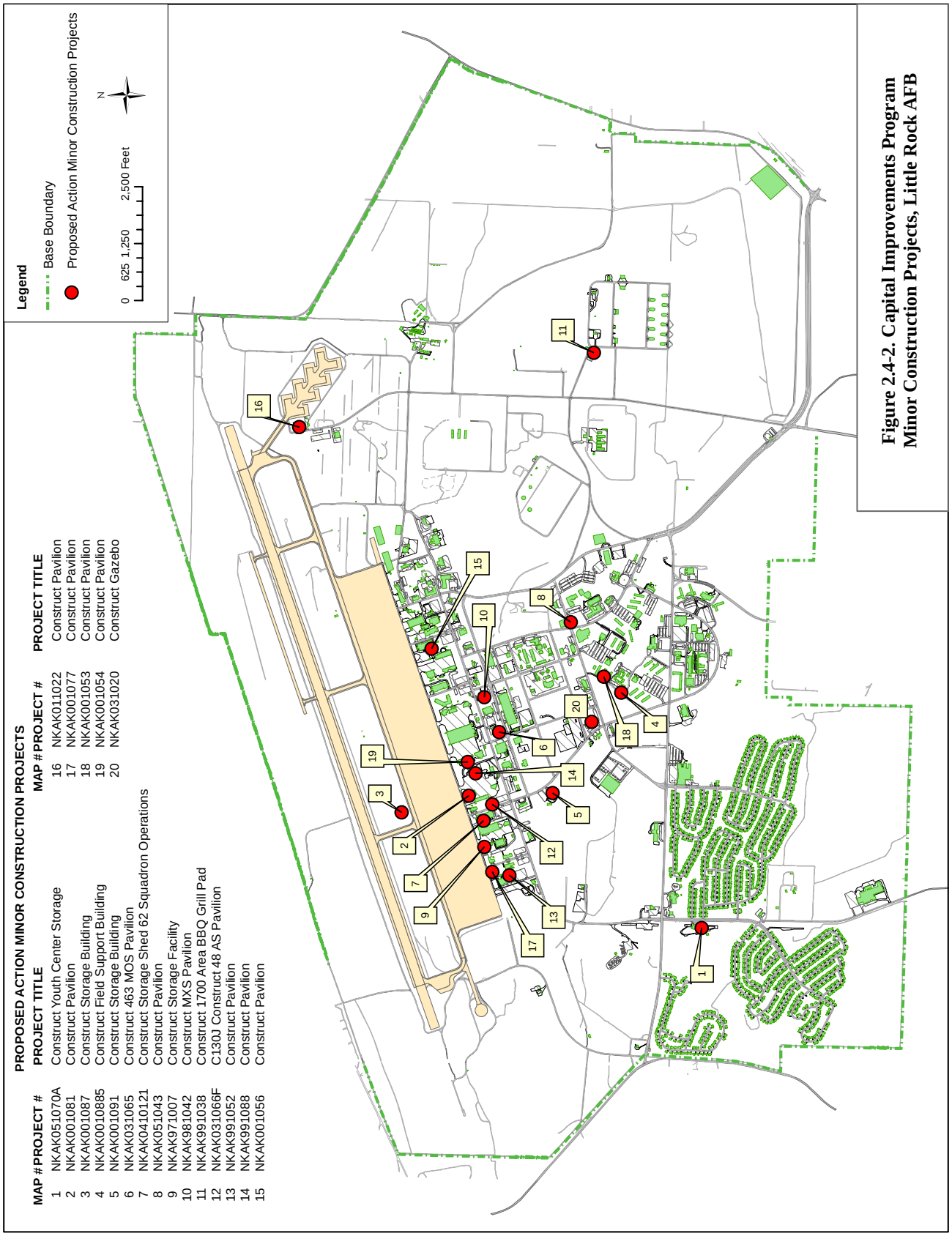


Figure 2.4-2. Capital Improvements Program Minor Construction Projects, Little Rock AFB

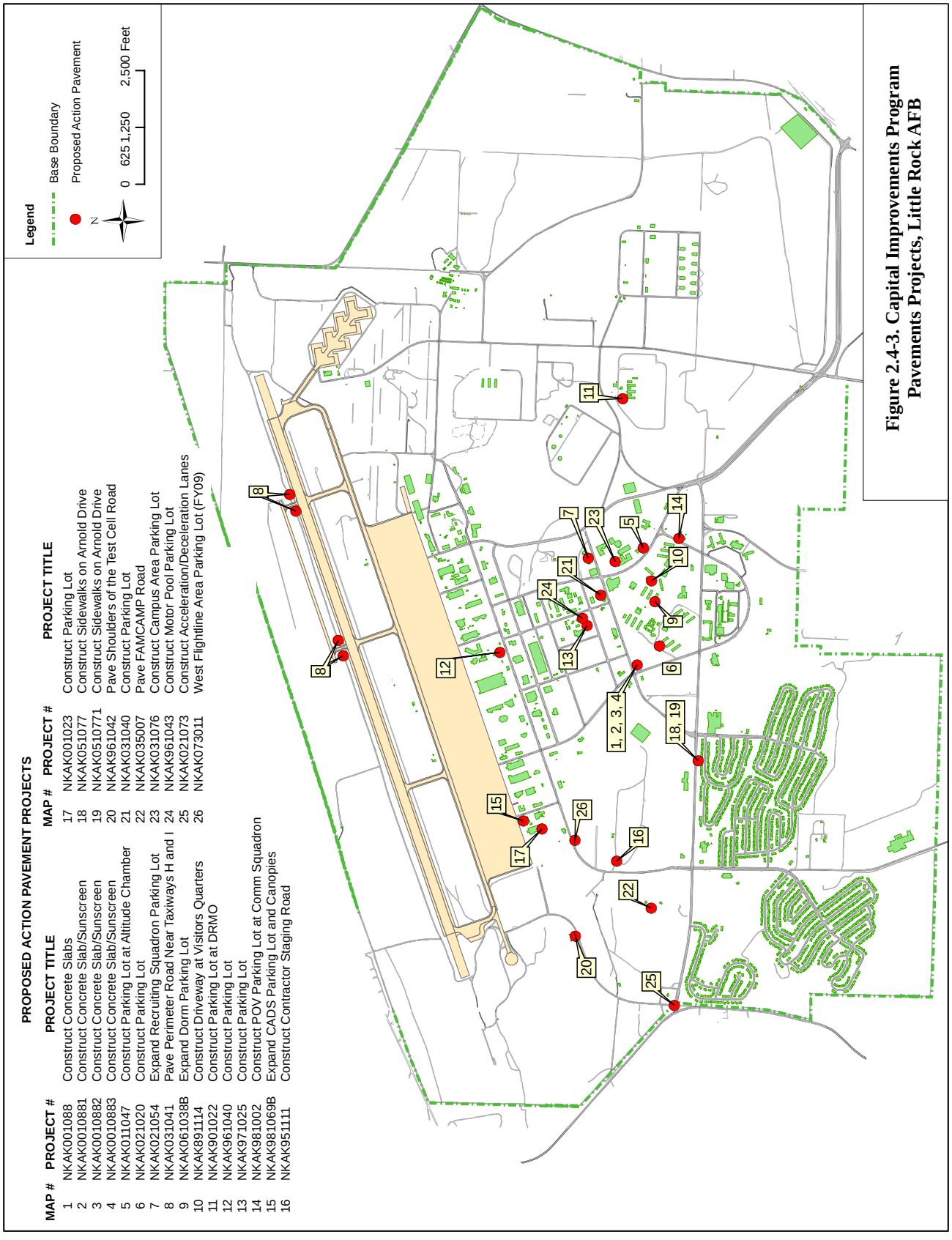


Figure 2.4-3. Capital Improvements Program Pavements Projects, Little Rock AFB

Table 2.4-3. Proposed Demolition Under the Proposed Action, Little Rock AFB

Project No.	***Project Description***	***Scope (SF)***	***Land Use Area***
NKAK041065A	Consolidated Liquid Fuels Lab	1,726	Industrial
NKAK041065B	Consolidated Liquid Fuels Lab	275	Industrial
NKAK012995	Audio Visual Facility	4,404	Airfield Operations
NKAK061003B	Consolidated Base Operations	13,496	Airfield Operations
NKAK021033B	Flight Support Kitchen	920	Airfield Operations
NKAK071001	Modular Facility	6,216	Industrial
NKAK081001	Security Forces Operations Facility	5,722	Administrative
NKAK011017	Warehouse	9,789	Administrative
NKAK071002B	Consolidated Base Photo Lab	14,529	Industrial
NKAK081002	Airman Dining Facility	14,790	Community Commercial
NKAK953003	Visiting Quarters	25,925	Housing Unaccompanied
	AAFES Exchange	26,403	Outdoor Recreation
NKAK031002	AF Modular Clinic Facility	2,052	Medical
NKAK041065	Consolidated Construction Fuels Maintenance	0	Industrial
	Air Mobility Maintenance/Life Support	5,537	Airfield Operations
	Total	**131,784**	**3.0 acres**

SF = square feet; AAFES = Army and Air Force Exchange Service; AF = Air Force

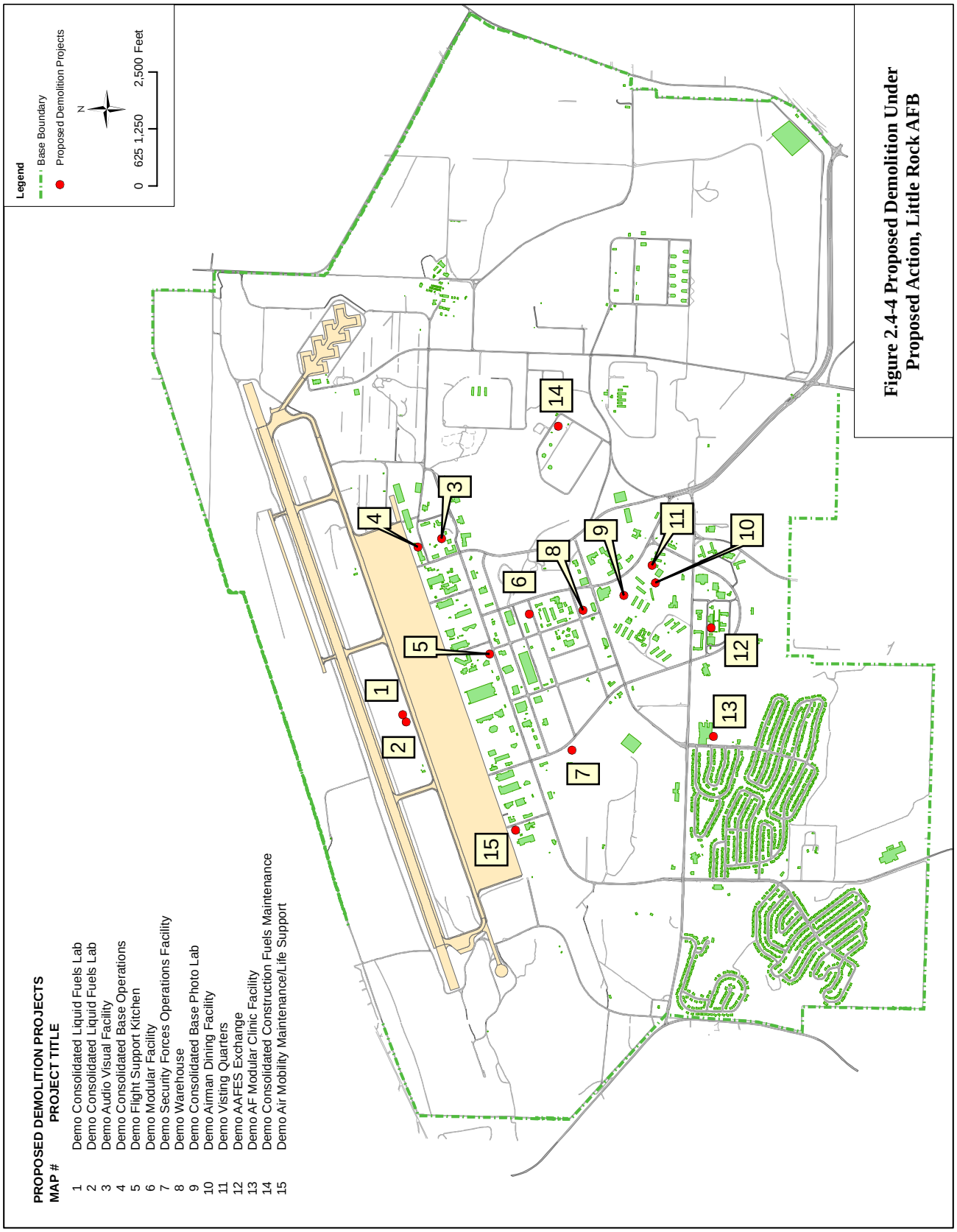


Figure 2.4-4 Proposed Demolition Under Proposed Action, Little Rock AFB

2.5.1 POTENTIAL SUSTAINABLE POPULATION

Little Rock AFB currently supports a baseline population of approximately 13,466 military, military dependent, student, and civilian personnel. Based on an analysis of potential housing (see Appendix B), it has been determined that the base could accommodate an additional 6,916 personnel, resulting in a projected population of 21,894.

2.5.2 POTENTIAL DEVELOPABLE ACREAGE

Based on an analysis of the existing and future land use plans and eliminating parcels that have building constraints associated with them, there are 127 individual parcels totaling 1,522.6 acres of land available for development (Figure 2.5-1). Table 2.5-1 identifies acreage per land use area that has been identified as developable. Based on the current development ratios per land use area, the square footage of building and pavements that can be accommodated within these developable areas can be estimated. As shown, Little Rock AFB can accommodate an additional 3 million square feet (SF) of building space, with an accompanying 360 acres of pavements, which would include roadways, sidewalks, and parking areas (Table 2.5-2).

2.5.3 POTENTIAL SUSTAINABLE MISSION LEVELS

There is a current aircraft inventory of 75 PAI and 10 BAI. Based on this existing fleet, there are 116,600 annual operations currently performed at the Little Rock AFB airfield. Based on Federal Aviation Administration (FAA) standards, there is an identified 210,000 potential annual operations that could be performed at the airfield. Depending on various weather conditions, the number of operations that could be conducted on the runway would be limited to 53 operations per hour. Additionally, the airspace utilized by Little Rock AFB aircraft was evaluated. Based on an evaluation of the capacity of the airfield at Little Rock AFB, as well as the military training airspace used by these aircraft, it was determined that Little Rock AFB could accommodate 39 additional C-130 aircraft, and the operations associated with these aircraft.

2.6 NO ACTION ALTERNATIVE

Under the No Action Alternative, there would be no increase in personnel at Little Rock AFB; there would be no increase in the number of aircraft assigned at Little Rock AFB; there would be no increase in night-time flying operations; and finally there would be no construction or demolition accomplished in support of the CIP. This alternative would not allow Little Rock AFB to accomplish congressionally mandated mission changes as a result of the 2005 BRAC findings. It would also limit the Base's ability to successfully conduct their mission and to maintain wartime readiness and training.

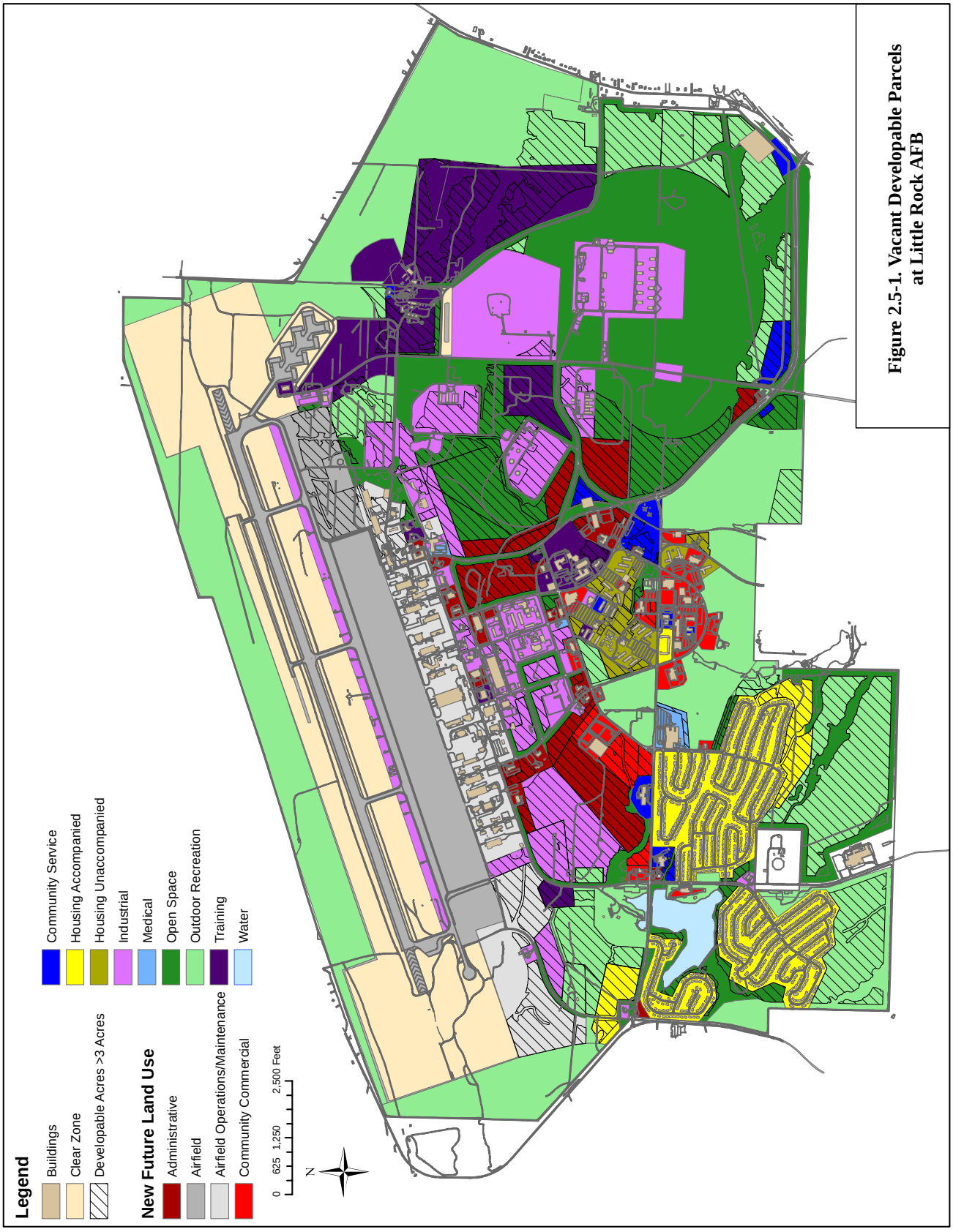


Figure 2.5-1. Vacant Developable Parcels at Little Rock AFB

Table 2.5-1. Vacant Developable Acreage by Land Use Category

Land Use Category	***Future Land Use Gross Acreage***	***Currently Developed Acreage***	***Undeveloped Acreage***	***Constrained Acreage***	***Developable Acreage***
Administrative	225.6	65.6	160.0	1.2	158.8
Aircraft Operations and Maintenance	313.2	180.3	132.9	51.4	81.5
Airfield	801.9	735.6	66.3	20.3	46.0
Clear Zone	413.2	413.2	0.0	0.0	0.0
Community-Commercial	124.9	69.5	55.4	27.1	28.3
Community-Service	70.7	18.7	52.0	20.8	31.2
Housing-Accompanied	404.4	346.7	57.7	6.6	51.0
Housing-Unaccompanied	79.3	56.1	23.2	0.0	23.2
Industrial	653.5	420.8	232.7	7.2	225.4
Medical	19.1	13.5	5.6	2.4	3.2
Open Space	1,043.1	0.0	1,043.1	836.4	206.8
Outdoor Recreation	1,631.2	415.8	1,215.4	718.5	496.9
Training	370.1	82.0	288.1	117.9	170.2
Water	42.7	0.0	42.7	42.7	0.0
Total	6,192.9	2,817.7	3,375.2	1,852.6	1,522.6

Note: Due to rounding, some numbers may not add up exactly.

Table 2.5-2. Summary of Potential Development Per Land Use Category

Land Use Category	***Developable Acreage***	***Building Square Footage Capability (SF)***	***Pavement Acreage Capability (Acres)***	***Total Impervious Surface Capability (Acres)***
Administrative	158.8	719,795	81.0	96.0
Aircraft Operations and Maintenance	81.5	527,010	38.0	50.1
Airfield	46.0	0	23.4	23.4
Clear Zone	0.0	0	0.0	0.0
Community-Commercial	28.3	153,928	16.6	20.1
Community-Service	31.2	202,187	12.5	16.4
Housing-Accompanied	51.0	429,925	9.8	19.7
Housing-Unaccompanied	23.2	219,686	11.2	13.8
Industrial	225.4	351,818	57.7	65.8
Medical	3.2	35,298	1.5	2.1
Open Space	206.8	10,001	5.8	6.1
Outdoor Recreation	496.9	554	64.4	64.4
Training	170.2	366,586	38.1	45.8
Water	0.0	0.0	0.0	0.0
Total	1,522.6	3,016,790	360.1	423.6

Note: Due to rounding, some numbers may not add up exactly.

2.7 PAST, PRESENT, AND REASONABLY FORESEEABLE ACTIONS IN THE REGION OF INFLUENCE

Cumulative impacts to environmental resources result from incremental effects of proposed actions when combined with other past, present, and reasonably foreseeable future projects in the ROI. Cumulative impacts can result from individually minor, but collectively substantial, actions undertaken over a period of time by various agencies (federal, state, and local) or individuals. In accordance with NEPA, a discussion of cumulative impacts resulting from projects that are proposed, under construction, or recently completed is required.

Short and long-term planning efforts at Little Rock AFB and the surrounding ROI include this action as well as several others. These projects have been evaluated for their potential to contribute to cumulative environmental impacts in the ROI. It has been determined that these projects cumulatively do not exceed any federal, state, or local environmental regulatory requirements or thresholds.

Recently completed projects include:

- Construction of Temporary Lodging Facility (TLF). These are four separate buildings that will provide TLF for military personnel moving to or from Little Rock AFB. There are two 14-unit buildings, one 12-unit, and one 10-unit building.

On-going projects include:

- Expansion of the Air Park Static Display. Eight to ten aircraft will be added to the existing static display of aircraft. Approximately 0.6 acre will be made impervious as a result of this action.

- Construction of the Triangle Shop. A Triangle Shop (Convenience Store) is being constructed on 1101 North Redmond Road, just south of Little Rock AFB. The NPDES permit indicates that 40 acres could be disturbed during construction.

- Construction of the North Lake Subdivision. This subdivision is being developed well east of Little Rock AFB, and east of Interstate (I) 67/167. The NPDES permit indicates that up to 80 acres could be disturbed during construction activities.

- Construction of the Stoneridge Subdivision. This subdivision is currently being developed on the west side of Little Rock AFB, near West Main and Harris Road. It is a 450-lot subdivision.

- Construction of C-130J Flight Simulator. The flight simulator will be a two-story, 40,000 SF facility that will provide a controlled environment for cockpit training.

- Military Family Housing (MFH) Project. Under this project, Little Rock AFB has entered into a real estate transaction with a private management entity to upgrade MFH on base. Over the course of this project, it is anticipated that 1,021 housing units will be renovated or replaced within nine years of contract implementation. Currently in Phase I of development.

- Construction of Child Development Center. The Child Development Center will provide an indoor facility and an outdoor activity area. The building will be approximately 18,000 SF.

Reasonably foreseeable planning efforts at Little Rock AFB and in the ROI include the following major projects:

- Correction of several airfield clear zone (CZ) violations. The CZ surrounding the airfield would be cleared of vegetation that violates the approach/departure and lateral safety zones. Approximately 400 acres of vegetated surface will be temporarily disturbed. Approximately 48 acres of wetlands could be impacted.

- ANG development of 17 acres at the southeast corner of the existing ramp for new hangars. This will include three new facilities and some ramp space totaling approximately 143,000 SF of additional facility space with an increase in impervious surface of approximately 5 acres.

- Construction of Airmen Dining Facility. A new facility would be constructed to replace the inadequately sized and configured dining facility. The new facility would be approximately 18,000 SF.

- Construction of an Education Center Complex. This complex would include 2 facilities totaling approximately 100,000 SF on two sites at Little Rock AFB. One building would support C-130 maintenance training, while the other facility would support general educational requirements of the military.

- Construction of a Maintenance Training Facility. This facility will provide opportunities for training of C-130 maintenance crews. The facility must be large enough to contain C-130 mock-up components. The facility will be approximately 31,000 SF.

- Establish Security Forces Regional Training Center. This center would provide a necessary training opportunity for periodic recertification and training of AETC and Air

Force Reserve Command (AFRC) Security Forces personnel in ground combat skills. There will be an eventual throughput of up to 2,880 Security Forces trainees and a permanent training cadre of 50 located at Little Rock AFB.

- Joint Cargo Aircraft Training. This is a replacement weapon system for older C-130 aircraft that will require initial flying training similar to the existing training conducted at Little Rock AFB. The training would increase the peak average daily student load (ADSL) in Fiscal Year (FY) 2010 but level back to current programmed ADSL.

- U.S. Marine C-130 Training. This is the expansion of current C-130J training to include United States Marine Corps (USMC) instructors, students, and equipment.

- Development of Army and Air Force Exchange Service (AAFES). Under this project, the AAFES would establish a new facility on Little Rock AFB. The building footprint would be 122,000 SF, and the parking area would be an additional 17 acres.

- North Belt Freeway Project. The North Belt Freeway is proposed to be a four-lane, divided, fully controlled access (Interstate type) facility constructed on new alignment with interchanges at selected locations. It would include two 12-foot travel lanes in each direction separated by a variable width median. This project will connect the I-430/I-40 interchange with the Highway 67/Highway 440 interchange in order to improve local and regional traffic service. Communities in and around the study area include Sherwood, Jacksonville, Gravel Ridge, Runyan Acres, North Little Rock, and Oak Grove.

- I-67/167 Interchange in Jacksonville. The purpose of this project is to relocate the I-67/167 northbound entrance ramp, reconstruct a portion of T.P. White Drive, and install a traffic light in Jacksonville. Proposed improvements to T.P. White Drive include: relocating a portion of the roadway to the east, adding a left turn lane at two locations, and widening the roadway. The length of the project associated with the entrance ramp is 0.3 mile (0.5 kilometer). The length of the project along T.P. White Drive is 0.6 mile (1.0 kilometer).

Little Rock AFB and the local community update facilities on a continual basis, as necessary. These planned activities have the potential to generate environmental impacts that could exacerbate impacts associated with the proposal described in this EA unless projects are planned and implemented with consideration for this potential. These on-going and proposed projects will be evaluated for their ability to contribute to cumulative impacts in association with the proposed action. Each of the foreseeable federal actions listed above either have been or will be the subject of subsequent NEPA analysis, which will evaluate the existing environment at the

time of each proposal. The existing environment described in each of those subsequent NEPA documents will include the actions of this proposal, as appropriate.

2.8 SUMMARY OF IMPACTS

Potential impacts resulting from the Proposed Action, the Alternative Action, and the No Action Alternative are summarized in Table 2.8-1.

Table 2.8-1. Summary of Potential Impacts

Resource Area	*Proposed Action*	*Alternative Action*	*No Action*
Earth Resources	Under the Proposed Action, an estimated 16.4 acres would be disturbed as a result of construction and pavements activities. Well maintained silt fences, wetting of the construction site, daily site inspections, and other BMPs would be used to limit or eliminate soil movement, stabilize runoff, and control sedimentation. Following construction, disturbed areas would be reestablished with appropriate vegetation. Given the relatively small area disturbed at any given time, and the employment of BMPs, impacts to earth resources would be minimal.	Under this alternative it is estimated that a total of approximately 430 acres would be disturbed as a result of construction and pavements activities. While this area in considerably larger than under the Proposed Action, it is clear that all this construction activity would not occur during the same time. Construction would occur as the need arose and as funds were available. In general, impacts to soils would be similar as those described under the Proposed Action.	Under the No Action Alternative, the 314 AW would maintain their existing facilities, and would not build new facilities. Similarly, there would be no facility demolitions. No impacts to earth resources would occur as a result of the No Action Alternative.
Water Resources	Construction under the Proposed Action would result in approximately 13.4 acres of new impervious surfaces. The increased runoff would be managed through procedures to moderate the volume and slow the discharge to water bodies. A Phase I NPDES General Construction Permit and associated SWPPP would be required for each project. Construction activities would not occur within the 100-year floodplain. Impacts to water resources would be expected to be minimal.	Construction under the Alternative Action would result in approximately 424 acres of new impervious surfaces. The increased runoff would be managed through procedures to moderate the volume and slow the discharge to water bodies. A Phase I NPDES General Construction Permit and associated SWPPP would be required for each project. It is likely that a storm water feature approaching the size of Base Lake would be required within open spaces within the base boundary to manage the storm water runoff under this alternative. Construction activities would not occur within the 100-year floodplain. Impacts to water resources would be expected to be minor.	Under the No Action Alternative, construction associated with the General Plan and BRAC related projects would not occur. There would be no impacts to the 100-year floodplain. There would be no impacts to water resources as a result of the No Action Alternative.

Table 2.8-1. Summary of Potential Impacts

Resource Area	*Proposed Action*	*Alternative Action*	*No Action*
Biological Resources	Under the Proposed Action, virtually all proposed construction activities would occur within the main cantonment area on Little Rock AFB. Therefore, no quality habitat would be removed. Vegetation and wildlife that exist in the main cantonment area are well-adapted to this environment. No impacts to threatened, endangered, or otherwise sensitive species are expected. Coordination with the USFWS regarding the interior least tern will continue to ensure that there are no impacts to this species.	As with the Proposed Action, little to no impact to vegetation or wildlife populations would be expected. These species are already well adapted to life on an active military installation. Given that there are no identified locations for specific projects, once these locations have been identified, the base Natural Resources Coordinator should be consulted to ensure that other sensitive species are not present in the project-specific location. Impacts to biological resources would be expected to be minimal.	Under the No Action Alternative, proposed construction and demolition would not occur. There would be no increase in assigned personnel at Little Rock AFB, and there would be no increase in assigned aircraft. Similarly, there would be no increase in night-time flying operations. There would be no impacts to biological resources as a result of the No Action Alternative.
Air Quality	As a result of the Proposed Action, annual emissions would increase during the duration of the construction as follows: 4.0 tons CO, 1.2 tons of volatile organic compounds (VOCs), 16.8 tons of NO_2, 0.1 tons of SO_2, 1.3 tons of particulate matter less than or equal to 10 micrometers in diameter (PM_{10}). As a result of commuting emissions, it is expected that annual emissions would increase as follows: 47.2 tons CO, 4.0 tons of VOC, 3.5 tons of NO_2, 0.2 tons of SO_2, 2.6 tons of PM_{10}. As a result of other operational increases in emissions, it is expected that annual emissions would increase as follows: 123.3 tons CO, 28.1 tons of VOC, 96.6 tons of NO_2, 6.3 tons of SO_2, 37.4 tons of PM_{10}. It is expected that these changes in emissions due to the Proposed Action would not result in any long-term impacts on the air quality Pulaski County or Air Quality Control Region (AQCR) 016.	As a result of the Alternative Action, annual emissions would increase during the duration of the construction as follows: 55.0 tons CO, 14.6 tons of VOC, 195.0 tons of NO_2, 4.1 tons of SO_2, 16.0 tons of PM_{10}. As a result of commuting emissions, it is expected that annual emissions would increase as follows: 592.2 tons CO, 50.4 tons of VOC, 44.4 tons of NO_2, 2.6 tons of SO_2, 33.3 tons of PM_{10}. As a result of other operational increases in emissions, it is expected that annual emissions would increase as follows: 385.3 tons CO, 87.8 tons of VOC, 301.7 tons of NO_2, 19.6 tons of SO_2, 117.1 tons of PM_{10}. It is expected that these changes in emissions due to the Proposed Action would not result in any long-term impacts on the air quality Pulaski County or AQCR 016.	Under the No Action Alternative, proposed construction and demolition would not occur. There would be no increase in assigned personnel at Little Rock AFB, and there would be no increase in assigned aircraft. There would be no impacts to air quality.

Table 2.8-1. Summary of Potential Impacts

Resource Area	*Proposed Action*	*Alternative Action*	*No Action*
Noise	Under the Proposed Action, average daily operations at Little Rock AFB would increase from approximately 448 to approximately 519. As a result of this increase, an additional 1,125 acres (both on-base and off-base) would be within the 65 decibel (dB) contours. There are no identified sensitive noise receptors that would be impacted by this. Impacts from noise would be expected to be minimal.	Under the Alternative Action, average daily operations at Little Rock AFB would increase from approximately 448 to approximately 669. As a result of this increase, an additional 1,933 acres (both on-base and off-base) would be within the 65 dB contours. There are no identified sensitive noise receptors that would be impacted by this. Impacts from noise would be expected to be minimal.	Under the No Action Alternative there would be no construction, no increase in personnel, and no increase in aircraft assigned at Little Rock AFB. There would be no impacts as a result of noise under the No Action Alternative.
Airspace	Based on an additional 12 C-130 aircraft, annual airfield operations would increase 16 percent, from 116,575 to 134,900. Use of other military training airspace increase by a similar 16 percent. The airfield and airspace assets in general, are physically able to accommodate the increased number of C-130 operations associated with the Proposed Action.	Based on an additional 39 C-130 aircraft, annual airfield operations would increase 50 percent, from 116,575 to 173,900. Use of other military training airspace increase by a similar 50 percent. The airfield and airspace assets in general, are physically able to accommodate the increased number of C-130 operations associated with the Alternative Action.	Under the No-Action Alternative, no additional aircraft would be stationed at Little Rock AFB. Operations at the airfield and in the military training airspace would continue at the same levels as under current conditions, and there would be no impacts to airspace.
Land Use/Visual Resources	Under this alternative, an additional 1,125.2 acres (from baseline) would be located under the noise contours, with an additional 336 persons living in this area. There are no sensitive land use areas underlying these contours. Land use patterns, ownership, and management plans would not be expected to change based on the modification of aircraft operations.	Under this alternative, an additional 1,933.4 acres (from baseline) would be located under the noise contours, with an additional 609 persons living in this area. There are no sensitive land use areas underlying these contours. Land use patterns, ownership, and management plans would not be expected to change based on the modification to aircraft operations.	No impacts to land use or visual resources are expected under the No Action Alternative. Little Rock AFB would continue to manage on-base development activity with the Base General Plan and Architectural Compatibility Guide. Coordination with local communities affected by overflight activity would continue with the Air Installation Compatible Use Zone (AICUZ) program.
Socioeconomics	The addition of 600 full-time military personnel would represent an increase of 8.4 percent to the existing base employment of 7,163 personnel, and 5.0 percent to the existing Jacksonville employment of 11,951.	The addition of 6,916 full-time military personnel would represent an increase of 62.6 percent of the existing base population, 28.2 percent of the existing Jacksonville population of 29,916 persons, and 2.4	Under the No Action Alternative, there would be no increase in personnel at Little Rock AFB, no increase in the number of aircraft assigned, and no facility modifications in support of the CIP.

Table 2.8-1. Summary of Potential Impacts

Resource Area	*Proposed Action*	*Alternative Action*	*No Action*
	An associated 640 military dependents would accompany these personnel, yielding a direct population impact of 1,240 persons. An increase of this size would raise the Little Rock AFB population to 14,706, representing an increase of 9.2 percent in the base population, 4.1 percent in Jacksonville population, and less than 1 percent in the Pulaski County population. While these incoming personnel and their households would generate added demand for housing and services, the increase would not be expected to result in substantial socioeconomic consequences.	percent of the Pulaski County population. This action could result in a tightening of the housing market that could affect both housing supply and housing prices in Jacksonville and surrounding areas. In addition, the additional population could begin to stress community services such as schools, medical care, law enforcement, and others. Given that this expansion of personnel at Little Rock AFB would occur over many years, the stress on these systems would be spread out over a number of years and it is likely that upgrades to these services would occur in anticipation of this growth.	Population on base and in the ROI would not be affected. In addition, the construction-related employment and earnings impacts associated with the Proposed Action would not occur. No impacts to socioeconomic resources would occur under implementation of the No Action Alternative.
Cultural Resources	No NRHP-listed or eligible archaeological resources would be impacted by the proposed CIP. In the unlikely event that archaeological resources are encountered during ground-disturbing activities, per Section 2.1 of AFI 32-7065, *Cultural Resources Management*, work would stop at that location and the resources would be managed in compliance with Section 106 of the NHPA as described in the Little Rock Integrated Cultural Resources Management Plan (ICRMP). There would be no effect to NRHP-eligible architectural resources as a result of renovation or demolitions projects. There are no known federally-recognized Indian lands or resources at the location of the Proposed Action or on Little Rock AFB. In general, impacts to cultural resources would be expected to be minimal.	Within the boundaries of Little Rock AFB, there is one NRHP-eligible architectural resource and 26 that have the potential to be considered eligible once they reach 50 years of age. Character-changing alterations to any of these buildings as a result of the maximum capability development alternative could adversely impact their NRHP status. Any building proposed for modification must be coordinated with the base cultural resources manager and conducted in compliance with Section 106 of the NHPA. There are no known federally-recognized Indian lands or resources at the location of the Proposed Action or on Little Rock AFB. In general, impacts to cultural resources would be expected to be minimal.	No impacts to cultural resources are expected under the No Action Alternative. The resources would continue to be managed in compliance with Federal law and USAF regulation.

Table 2.8-1. Summary of Potential Impacts

Resource Area	*Proposed Action*	*Alternative Action*	*No Action*
Safety	Providing new facilities for the 314 AW that support operational requirements, are properly sited with adequate space and a modernized supporting infrastructure would generally enhance ground, explosive, flight safety, training, maintenance and support procedures, security functions, and other activities conducted by the unit. The relative risk of a Class A mishap would remain unchanged. Bird-Aircraft Strike Hazard (BASH) incidence would be expected to increase from 41 strikes per year to 47. In general, impacts to safety would be minimal.	Providing new facilities for the 314 AW that support operational requirements, are properly sited with adequate space and a modernized supporting infrastructure would generally enhance ground, explosive, flight safety, training, maintenance and support procedures, security functions, and other activities conducted by the unit. The relative risk of a Class A mishap would remain unchanged. BASH incidence would be expected to increase from 41 strikes per year to 61. In general, impacts to safety would be minimal.	Under the No Action Alternative, no facility construction, modification, or demolition would be accomplished. Also, no additional C-130 aircraft would be stationed at Little Rock AFB, and flight activities would remain as under current conditions.
Infrastructure	The increase of 600 full-time personnel would increase vehicular traffic on base by 4.5 percent, which would increase traffic volumes on the internal and external roadways associated with the base. The proposed increase in volume would have relatively little impact to the network. The Little Rock AFB roadway intersections should operate at an acceptable Level of Service (LOS) and the gate network should be able to accommodate the increased volume. The utility systems supporting potable water, sewer, electrical, and natural gas services are fully capable of supporting a 6 to 8 percent increase in demand. Localized temporary service disruptions may occur during construction of new facilities, but would not constitute a substantial disruption to utility LOS.	The increase of 6,916 full-time personnel and 3,000,000 SF of building space under the Alternative Action would result in an estimated 5,000 additional people commuting to the base. This would degrade the internal roadway network on some segments and at intersections throughout the base. Therefore, some roadway improvements and signal installations may be needed at high volume locations. The main gate would need an extra lane added to adequately handle the increase in traffic. The utility systems supporting potable water, sewer, electrical, and natural gas services are fully capable of supporting a 43 percent increase in demand. Localized temporary service disruptions may occur during construction of new facilities, but would not constitute a substantial disruption to utility LOS.	No impacts would be anticipated to transportation or utilities under the No Action Alternative.

Table 2.8-1. Summary of Potential Impacts

Resource Area	*Proposed Action*	*Alternative Action*	*No Action*
Solid and Hazardous Materials and Wastes	The Proposed Action would result in an increase of up to 16 percent in the amount of hazardous materials and petroleum products used and hazardous wastes generated. These would be managed in accordance with existing protocols. New buildings would be designed to contain potential spills of hazardous and petroleum materials and wastes. The increase in the generation of hazardous and petroleum waste would not affect the base's large quantity generator status. Construction and demolition activities near IRP sites and Areas of Concern (AOCs) would stop if visibly contaminated soils are encountered. Demolition activities would result in the generation of about 5,000 cubic yards of debris. Any asbestos and/or lead-based paint encountered during demolition and renovation would be managed and abated in accordance with ADEQ regulations. All solid waste would be disposed of in accordance with appropriate regulations and the regional landfill has sufficient capacity to accommodate construction debris associated with the Proposed Action. These changes to hazardous and solid materials and wastes would be minor.	The Alternative Action would result in an increase of approximately 50 percent in the amount of hazardous materials and petroleum products used and hazardous wastes generated. These would be managed in accordance with existing protocols. New buildings would be designed to contain potential spills of hazardous and petroleum materials and wastes. The increase in the generation of hazardous and petroleum waste would not affect the base's large quantity generator status. Construction and demolition activities near IRP sites and AOCs would stop if visibly contaminated soils are encountered. Demolition activities would result in the generation of about 5,000 cubic yards of debris. Any asbestos and/or lead-based paint encountered during demolition and renovation would be managed and abated in accordance with ADEQ regulations. All solid waste would be disposed of in accordance with appropriate regulations and the regional landfill has sufficient capacity to accommodate construction debris associated with the Proposed Action. These changes to hazardous and solid materials and wastes would be minor.	Under the No Action Alternative, proposed construction and demolition would not occur. Therefore, there would be no corresponding increase in the amount of solid and hazardous materials and wastes generated.

3.0 EXISTING CONDITIONS

Chapter 3.0 describes the existing environmental and socioeconomic conditions that may be affected by the Proposed Action. The potential environmental and socioeconomic impacts of implementing the Proposed Action or its alternative are described in Chapter 4.0.

In compliance with NEPA, CEQ guidelines, and AFI 32-7061, the description of the affected environment focuses on those resources and conditions potentially subject to impacts. These resources and conditions include: earth resources, water resources, biological resources, air quality, airspace management and air traffic control, noise, military training airspace, land use and visual resources, socioeconomics and environmental justice, cultural resources, safety, infrastructure, and solid and hazardous materials and wastes.

3.1 EARTH RESOURCES

3.1.1 DEFINITION OF THE RESOURCE

Earth resources include geology, soils, and topography. Geologic resources of an area typically consist of surface and subsurface materials and their inherent properties. The term soils refers to unconsolidated materials formed from the underlying bedrock or other parent material. Soils play a critical role in both the natural and human environment. Soil drainage, texture, strength, shrink-swell potential, and erodibility all determine the suitability of the ground to support man-made structures and facilities. Topography refers to the region's surface features, including its vertical relief.

These resources may have scientific, historical, economic, and recreational value. The ROI for geology and soils for this analysis includes the entire installation at Little Rock AFB.

3.1.2 EXISTING CONDITIONS

3.1.2.1 Geology

The state of Arkansas is divided into several very distinct physiographic regions. A southwest to northeast diagonal line divides the state into the Ozark/Ouachita highlands and the Mississippi Alluvial Plain/Gulf Coastal Plain. The highland regions are further divided by the Arkansas River Valley, which follows the flow of the Arkansas River through the highland regions.

Little Rock AFB lies on the diagonal transition between the Ouachita highlands and the lowlands. The rock formations in the highland area are dominated by well-lithified sandstones, shales, limestones, and dolostones of Paleozoic age. A thin drape of younger unconsolidated clays, sands, and gravel (alluvium), is often found in valley floors and is associated with streams

and rivers. The sedimentary deposits of the lowlands are mainly unconsolidated clay, sand, and gravel of Quaternary age, poorly consolidated deposits of clay, sand, silt, limestone, and lignite of Tertiary age, and consolidated deposits of Cretaceous marl, chalk, limestone, sand, and gravel (United States Department of Agriculture [USDA] 1975, Natural Resources Conservation Service 2002).

Most of Little Rock AFB is located on the Pennsylvanian age Middle and Lower Atoka Formations. The hills are composed of sandstones with board valleys of shale and siltstone. These beds of sedimentary rock strike east-west and dip to the north. There are also thrust faults that strike east-west also. In some eastern and southeastern areas of the base, there is the Midway Formation of the Paleocene age. This formation is composed of limestone and dark gray clay, which generates an expansive soil that has been known to cause foundation problems in many areas of Pulaski County (Arkansas Geological Commission 2006).

3.1.2.2 Soils

Soils in the Little Rock AFB area of Pulaski County are generally formed in weathered material from acid sandstone and shale, and in valley fill from local highlands. Two soil associations are identified on the base. The northern half of the base is predominantly the Leadvale-Guthrie-Linker association; the Linker-Mountainburg association occurs in the southern half of the base. Most of the improved and some of the semi-improved portions of the base are classified as Urban Land or Urban Land complexes of several soil series. Urban Land is either substantially covered by works and structures or has been so altered during construction that separate classification is impractical (USDA 1975).

There are seven major soil series identified as originally occurring on Little Rock AFB (Figure 3.1-1). In general, these soils are acidic and over much of the base are shallow and well drained (USDA 1975).

The *Amy* soil series is comprised of silt loam and is located in broad upland flats and on flood plains of local drainage ways. This soil series is deep, poorly drained with a high seasonal water table, and generally presents severe limitations for construction. *Amy* soils are present in the southeastern portions of the base (USDA 1975).

The *Guthrie* soil series is comprised of level, poorly drained silt loam on stream terraces and in depressions on the top of mountains. This soil series is deep and poorly drained, with a high seasonal water table and severe construction limitations. The *Guthrie* series is present in northern and eastern portions of the base (USDA 1975).

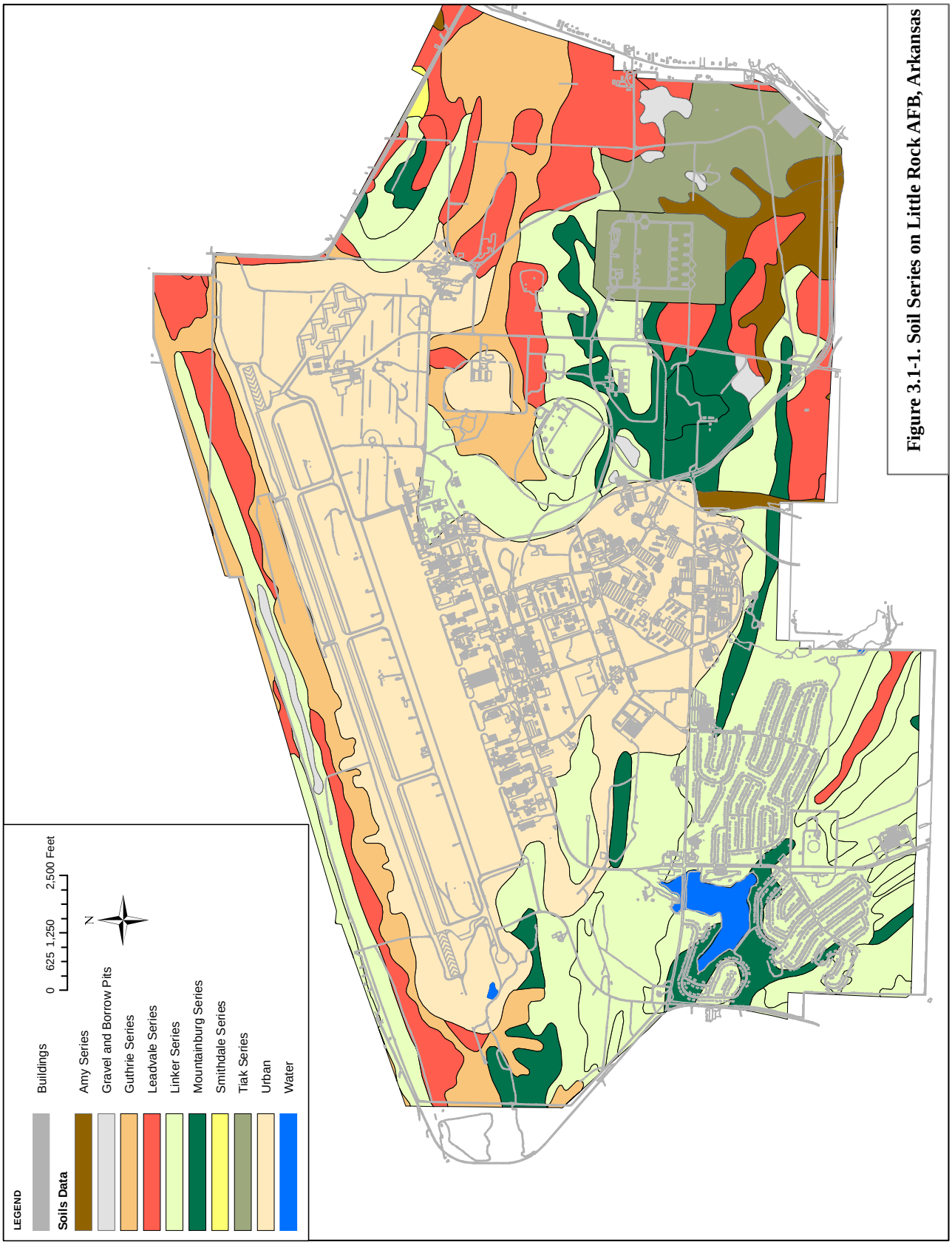


Figure 3.1-1. Soil Series on Little Rock AFB, Arkansas

The *Leadvale* series is comprised of nearly level and gently sloping silt loam in valleys and on the top of low mountains. This series is suitable for most uses and occurs in the northern and southeastern portions of the base (USDA 1975).

The *Linker* soil series consists of well-drained, gently sloping to moderately steep soils on the top and sides of mountains, on benches and on low ridges in valleys. The series is composed of fine sandy loam in the upper layers and clay loam in the deeper layers. The depth to bedrock is about 30 inches. The shallow depth to bedrock of this series presents a moderate construction constraint. *Linker* soils are widely dispersed over a large portion of the base (USDA 1975).

The *Mountainburg* soil series consists of well-drained fine sandy loam on gently to moderately steep slopes on the top and sides of mountains, on benches, and on low ridges in valleys. This series is very shallow, with an average depth to bedrock of 15 inches, presenting severe limitations to excavation. *Mountainburg* complexes are widely dispersed over the base (USDA 1975).

The *Smithdale* soil series is comprised of fine sandy loam, clay loam, and sandy loam. It is present in gently to moderately sloping upland areas. The soil is deep, well-drained and occurs in a very limited distribution on the eastern portion of the base (USDA 1975).

The *Tiak* soil series is comprised of a fine sandy loam surface layer over a deep layer of silty clay. The soil is moderately well drained and nearly level to gently sloping. *Tiak* soils are present in the southeastern portion of the base and present moderate to severe construction limitations due to their high clay content (USDA 1975).

The vast majority of proposed construction is in an area of past development on the base and is classified as *Urban land* (USDA 1975). Pavement or buildings cover most of these areas, and the land that is not covered by pavement has been so altered during construction activities that it is not practical to map. Soil grading has severely altered the original soils and they can no longer be classified other than as Urban soil.

3.1.2.3 Topography

Most of Little Rock AFB has rolling topography with gentle slopes. Steeper slopes occur in the stream valleys in the northwest and southwest corners of the base. Long, narrow ridges, oriented from east to west, typify the region to the north of the base. The southernmost of these ridges lies just north of the airfield (Parsons Engineering Science 1998).

The elevations on the base range from the highest point of 421 feet above mean sea level (MSL) to a low of 258 feet above MSL along the eastern perimeter (Parsons Engineering Science 1998).

3.2 WATER RESOURCES

3.2.1 DEFINITION OF THE RESOURCE

Water resources analyzed in this EA include surface water and groundwater quantity and quality. Surface water resources comprise lakes, rivers, and streams and are important for a variety of reasons, including economic, ecological, recreational, and human health. Groundwater comprises the subsurface hydrologic resources of the physical environment and is an essential resource. Groundwater properties are often described in terms of depth to aquifer or water table, water quality, and surrounding geologic composition.

Other issues relevant to water resources include the downstream water and watershed areas affected by existing and potential runoff, and hazards associated with 100-year floodplains. Floodplains are defined by EO 11988, *Floodplain Management*, as "the lowland and relatively flat areas adjoining inland and coastal waters including flood-prone areas of offshore islands, including at a minimum, that area subject to a one percent or greater chance of flooding in any given year" (that area inundated by a 100-year flood). The values served by floodplains include natural moderation of floods, water quality maintenance, groundwater recharge, as well as habitat for many plant and animal species.

3.2.2 EXISTING CONDITIONS

3.2.2.1 Surface Water

Little Rock AFB lies within the Arkansas River Basin of central Arkansas and is located within the Bayou Meto drainage area. This area receives a mean annual precipitation of 49 inches per year (National Oceanic and Atmospheric Administration 2006). Drainage on Little Rock AFB is controlled by open drainage courses and underground storm drains, and joins the area-wide drainage flowing into three secondary streams: Cypress Branch on the west, Rocky Branch on the south, and Jacks Bayou on the east. Additional unnamed secondary streams are located southwest, southeast, and northeast of the base. All streams from the base eventually flow into Bayou Meto, which flows southeast and joins the Arkansas River approximately 100 miles downstream from the base (ADEQ 2003; USAF 1993).

There are a number of impoundments and open water bodies at Little Rock AFB including Base Lake (a 37 acre lake in the southwest corner of the base), three golf course ponds used for irrigation water (ranging from 1.1 to 2.3 acres in area), seven small ponds on the east side of the base (ranging from 0.2 to 1.2 acres), and a number of small "borrow" ponds apparently created by excavations for fill material.

Little Rock AFB is permitted to discharge storm water runoff via four discharge points into tributaries to Bayou Meto. Storm water discharges are permitted in accordance with Little Rock AFB's NPDES permit and are regulated by USEPA. Water quality is monitored at these four locations (Figure 3.2-1) and may also be monitored at three inactive, alternate sites. Testing of the effluent is conducted on an annual basis and the system is in compliance with all NPDES and ADEQ standards (personal communication, Love 2006). The nearest ADEQ surface water quality stations within the drainage basin are on Bayou Meto and Bayou Two Prairie at distances of 50 to 75 miles downstream (ADEQ 2003).

3.2.2.2 Groundwater

The base obtains all of its water supply from surface water reservoirs in Little Rock. There are no water production wells on the base. Groundwater is not used for drinking, irrigating, or industrial purposes. Municipal wells for the city of Jacksonville are located approximately 4.5 miles southeast of Little Rock AFB and reportedly take water from a deep alluvial aquifer approximately 104 to 129 feet below the surface.

The limited available information about groundwater at Little Rock AFB is from IRP monitoring wells. Generally, these wells are shallow and have low yield. Depth to the groundwater table varies across the base with depth to bedrock and season. In some locations, the bedrock is very shallow and the groundwater table occurs near the surface. At other locations, the water table is as much as 30 feet below the surface.

3.2.2.3 Floodplain

There is the potential for several areas of Little Rock AFB to be impacted by a 100-year flood. The areas subject to flooding are primarily along the natural and man-made impoundments and drainage channels that control storm water flow on the Base. A floodplain study using 2-foot contours was completed in 2001 to provide a more precise depiction of the 100-year floodplain (URS, Inc. 2001). Figure 3.2-2 delineates the 100-year floodplain based on existing maps and information.

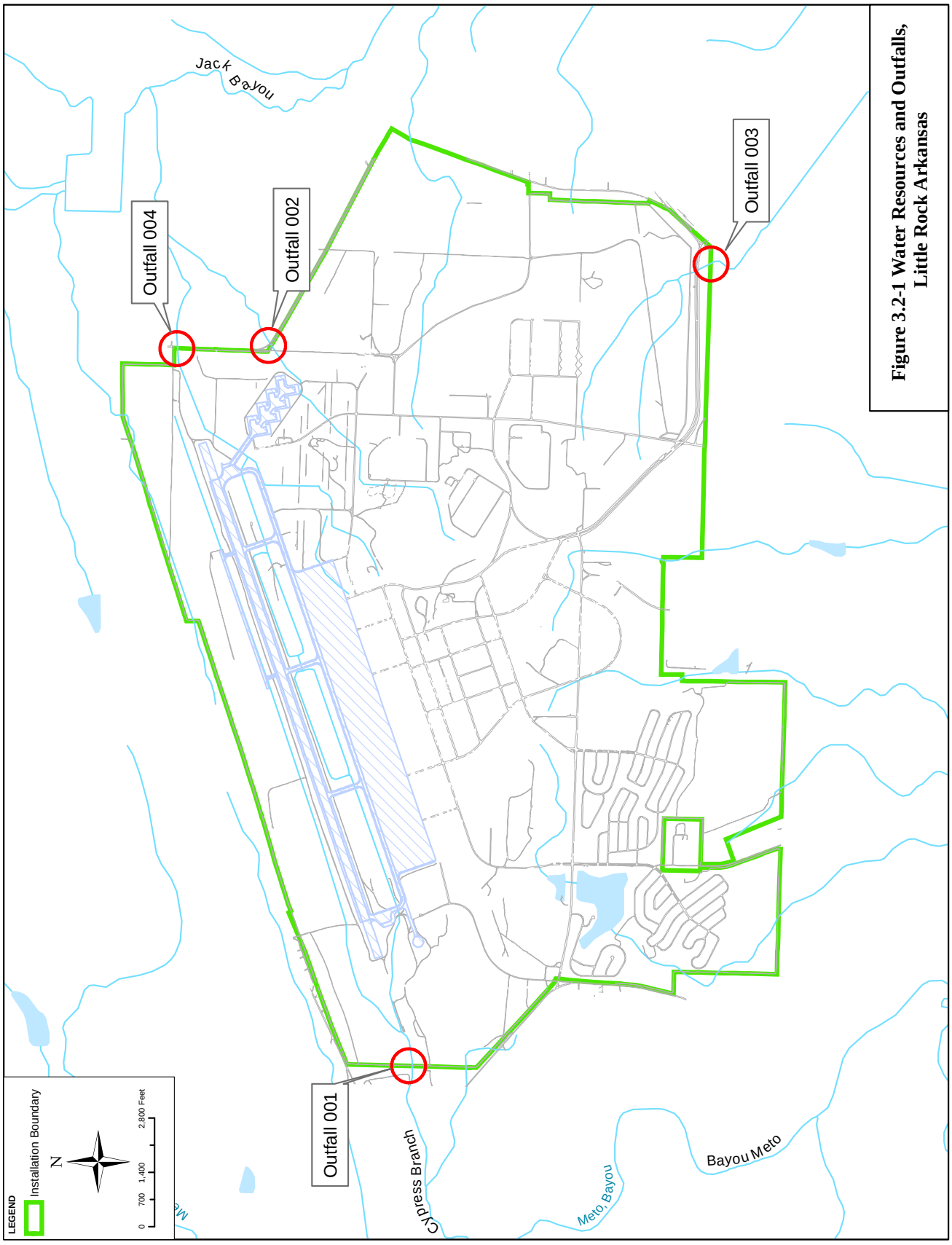


Figure 3.2-1 Water Resources and Outfalls, Little Rock Arkansas

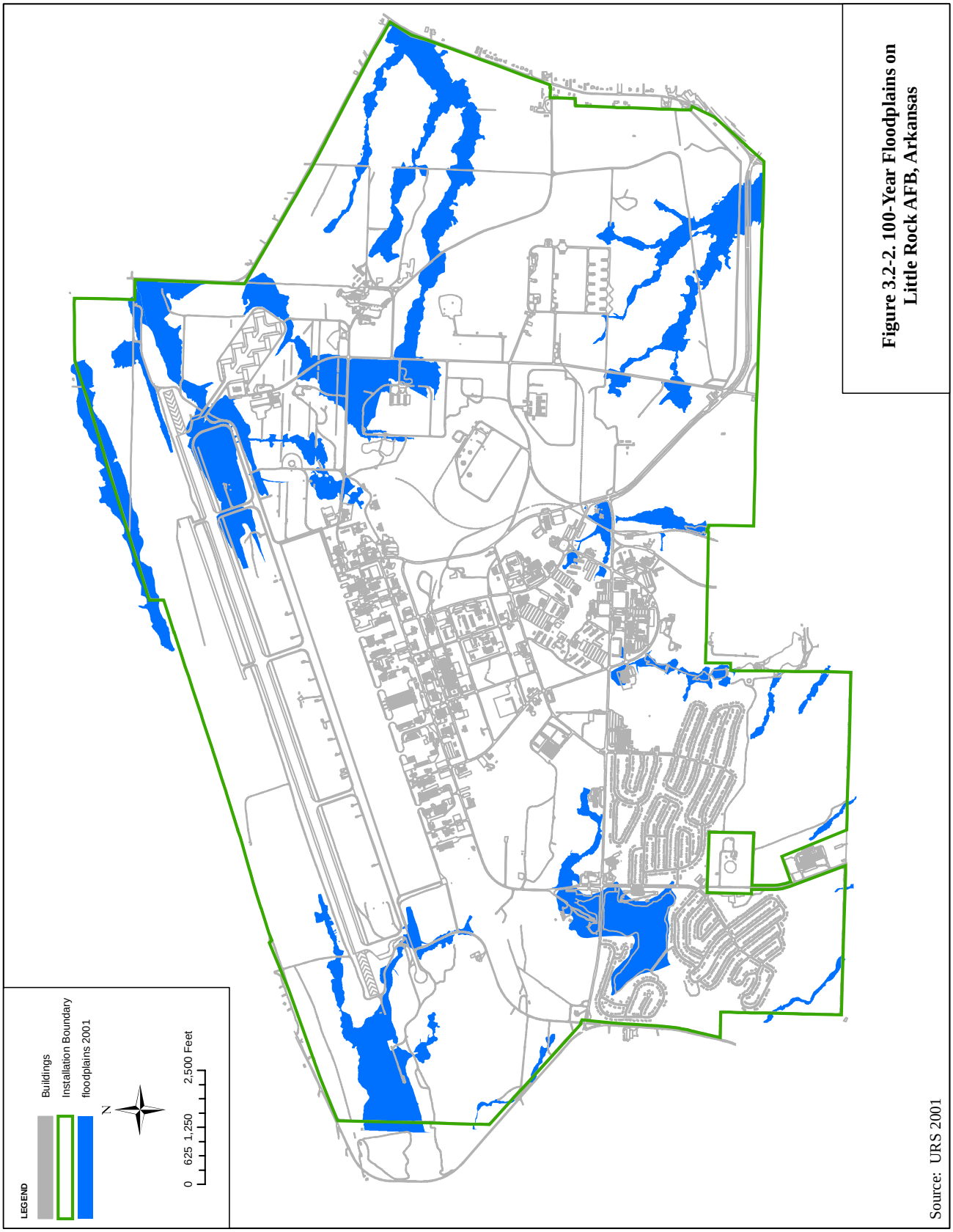


Figure 3.2-2. 100-Year Floodplains on Little Rock AFB, Arkansas

3.3 BIOLOGICAL RESOURCES

3.3.1 DEFINITION OF THE RESOURCE

Biological resources include native or naturalized plants and animals and the habitats, including wetlands, in which they occur. Although the existence and preservation of biological resources are intrinsically valuable, these resources also provide essential aesthetic, recreational, and socioeconomic values to society. This section focuses on plant and animal species and vegetation types that typify or are important to the function of the ecosystem, are of special societal importance, or are protected under federal or state law or statute. For purposes of this assessment, sensitive biological resources are defined as those plant and animal species listed as threatened or endangered by the USFWS and species that are considered sensitive by the state or other entities. Three categories of protection status are included in this section including 1) federal listed threatened and endangered species, 2) state listed species, and 3) other sensitive species.

Federal Listed Threatened and Endangered Species. The ESA of 1973 provides protection to species listed under this category. Endangered species are those species that are at risk for extinction in all or a large portion of their range. Threatened species are those that could be listed as endangered in the near future.

State Listed Threatened and Endangered Species. The state-threatened and endangered species list in Arkansas is identical to the federal list for Arkansas.

Other Sensitive Species. Includes federal species of concern and species listed by other agencies such as the state Natural Heritage Programs. These are usually species of regional concern that are likely on the decline. These species receive no legal protection under the ESA or other statutes.

3.3.2 EXISTING CONDITIONS

Little Rock AFB is near the eastern edge of the Ouachita Mountains above the Mississippi Alluvial Plain and within the Arkansas Valley and Ridges Land resources area. The area is dominated by pines and upland hardwood forests that support a diverse flora and fauna (USAF 2002). Little Rock AFB contains hardwood forests, grassland plant communities, and waterways that all provide habitat for a variety of wildlife species.

3.3.2.1 Vegetation

The general vegetative cover in the area is the Southern Division of the Oak-hickory Region and more specifically, the Ouachita Mountains portion of the Interior Highlands. Historically, the pine-oak forest type was the most widespread in the uplands and common tree species were

shortleaf pine (*Pinus echinata*), post oak (*Quercus stellata*), blackjack oak (*Q. marilandica*), black oak (*Q. velutina*), and white oak (*Q. alba*). Common understory species were sassafras (*Sassafras albidum*), persimmon (*Diospyros virginiana*), and flowering dogwood (*Cornus florida*). More mesic areas contained mostly hardwood species including water oak (*Q. nigra*), willow oak (*Q. phellos*), black gum (*Nyssa slyvatica*), sycamore (*Platanus occidentalis*), and sweet gum (*Liquidamber styraciflua*) (USAF 2002). Prior to the establishment of Little Rock AFB in 1953, much of the land that historically supported the above forest types had been cleared for agricultural purposes. As a result of the base being located at this site, forest and woodland types have become reestablished. There is currently an estimated 2,820 acres of forest and woodlands on the base and the remaining land is covered with open fields and base facilities as well as a small amount of wetlands and aquatic habitat. The largest forest community currently on-base is the post oak/blackjack oak type (1,686 acres), followed by loblolly pine (*Pinus taeda*)/shortleaf pine forest (540 acres), and bottomland hardwood forest where pin oak (*Q. palustris*), sweet gum, and willow oak are common (590 acres). The pine stands are areas that were formerly cleared and then planted to pine while most of the remaining forest became established naturally (USAF 2002).

3.3.2.2 Wildlife

Invertebrates

Seven species of crayfish are found on Little Rock AFB. *Procambarus acutus* is the most abundant and widespread species, and is found in all habitat types including manmade drainages. A total of 451 insect taxa (a grouping of flora or fauna, such as species, or family) have been recorded on Little Rock AFB (USAF 2002). Aquatic macroinvertebrates and algae have been sampled from six locations on base. Eight algal taxa and six aquatic macroinvertebrate taxa have been found in streams on base (USAF 2002).

Amphibians and Reptiles

Thirty-eight species of amphibians and reptiles are documented from Little Rock AFB. This relatively large number of species in a small geographic area represents favorable diversity (USAF 2002). Thirteen species have been recorded from the mesic forests of Little Rock AFB, including the spotted salamander (*Ambystoma maculatum*), cricket frog (*Acris crepitans*), southern leopard frog (*Rana utricularia*), fence lizard (*Sceloporus undulatrus*), and hognose snake (*Heterodon platirhinos*). Species found in the grassy areas on base were limited to the three-toed box turtle (*Terrapene carolina triunguis*) and Fowler's toad (*Bufo woodhousei fowleri*) (USAF 2002).

Birds and Neotropical Migrants

A total of 122 species of birds were detected on base during recent surveys and 37 of these have been detected in the wooded and grassland habitat similar to the project area. Base-wide, 77 species were detected in the deciduous forest/woodland/oak savannah. Of these, 54 are considered breeding species with 33 being permanent residents and 21 migrating to the base to breed. Common to fairly common forest breeding permanent residents include the red-bellied woodpecker (*Melanerpes carolinus*), downy woodpecker (*Picoides pudescens*), blue jay (*Cyanocitta cristata*), Carolina chickadee (*Parus carolinensis*), tufted titmouse (*Parus bicolor*), and Carolina wren (*Thryothorus ludovicianus*). Common to fairly common forest and woodland breeding species that migrate to the base include the yellow-billed cuckoo (*Coccyzus americanus*), great crested flycatcher (*Myiarchus tyrannulus*), eastern wood-pewee (*Contopus sordidulus*), acadian flycatcher (*Empidonax occidentalis*), red-eyed vireo (*Vireo olivaceus*), Kentucky warbler (*Oporornis formosus*), and summer tanager (*Piranga rubra*). Twenty-four species were recorded in grassland habitats on Little Rock AFB and fairly common to common breeding species included the eastern kingbird (*Tyrannus tyrannus*), field sparrow (*Spizella pusilla*), and eastern meadowlark (*Sturnella magna*) (USAF 2002).

The primary game bird species on base are the wild turkey (*Meleagris gallopavo*) and bobwhite quail (*Colinus virginianus*). There are no density estimates although both are considered uncommon on the base. There are about 5,000 acres of wild turkey and 500 acres of bobwhite quail habitat on base (USAF 2002).

Bird species that breed in temperate North America and winter in the tropics are referred to as neotropical migrants and have become the focal point of much ornithological research, management, and conservation concern (Hagan and Johnston 1992, Finch and Stangel 1993). Forest fragmentation on the breeding grounds and the elimination of optimum wintering habitat in the tropics are likely the two major reasons for these declines (Flather and Sauer 1996, Sheery and Holmes 1996). In addition, the loss of important stopover habitat used during migration may affect the survival of neotropical migrants (Moore et al. 1993).

An estimated 110 neotropical migrant land birds occur in the Midwestern U.S. and 48 (44 percent) of these species have been reported from Little Rock AFB (Thompson et al. 1993, USAF 2002). A total of 28 neotropical migrants on base inhabit the forested and woodland plant communities and of these, 20 are nesting species and 8 are only seen during migration.

Little Rock AFB occurs in the Ozark-Ouachita Highlands Region and an analysis of population trends of forest birds in this region showed that four species of neotropical land birds were declining and seven were possibly declining (Hunter et al. 1993). The acadian flycatcher was the only declining species reported from Little Rock AFB and this species is considered fairly

common on base. The eastern wood-pewee, great crested flycatcher, Louisiana waterthrush (*Seiurus motacilla*), and scarlet tanager (*Piranga olivacea*) were species that may be on the decline that were reported from Little Rock AFB. The eastern wood-pewee and great crested flycatcher are considered fairly common on base while the Louisiana waterthrush is uncommon and the scarlet tanager is occasional (USAF 2002).

Another species that has been declining but not included in the above study is the Kentucky warbler (Partners in Flight [PIF] 2006; National Audubon Society [NAS] 2002). Data from the Breeding Bird Survey indicates that all six of these species have declined in Arkansas for the period 1966 to 2000 (Table 3.3-1).

Table 3.3-1. Population Trends for Arkansas (recent change per year) for Six Neotropical Migrant Land Birds that Breed in the Forest Habitat on Little Rock AFB

Species	***Relative abundance on Little Rock AFB[1]***	***Trends (% change/year)***		
		1966-2000	***1966-1979***	***1980-2000***
Eastern Wood-Pewee	F	-2.3	-6.8	-0.1
Acadian Flycatcher	F	-2.3	-4.2	-1.2
Great Crested Flycatcher	F	-2.0	-3.1	-0.1
Kentucky Warbler	F	-2.8	-1.4	-4.0
Louisiana Waterthrush	U	-2.5	+1.5	-3.7
Scarlet Tanager	O	-0.4	+2.6	-1.6

Note: Relative abundance categories from breeding bird surveys on Little Rock AFB are based on the frequency and number seen during each survey. F = fairly common (usually found every visit and generally in low numbers), U =uncommon (usually present in suitable habitat and season but not likely detected on every visit, O = occasional (not always present, likely detected 2 to 5 times per year in suitable habitat).
Sources: Sauer et al. 2001, USAF 2002

Mammals

Fifty-three species of mammals occur in Pulaski County and many of these occur on Little Rock AFB. Nine species of small mammals were identified during sampling in various habitats on base and the cotton mouse (*Peromyscus gossypinus*) and deer mouse (*P. maniculatus*) were the two most common species. The cutover woods had the greatest diversity of species while the greatest densities of mammals were found in the young pine plantations. Five species of bats were observed and the red bat (*Lasiurus borealis*) and evening bat (*Nycticeius humeralis*) were the most commonly encountered species. Most of the bat species use a variety of habitats from grasslands to forests for foraging (USAF 2002).

The white-tailed deer (*Odocoileus virginianus*) is the principal game species on the base. Other less important mammal game species include the eastern cottontail rabbit (*Syvilagus floridanus*), fox squirrel (*Sciurus niger*), and gray squirrel (*S. carolinensis*). There are an estimated 5,000

acres of white-tailed deer habitat on the base. This habitat is rated as good for deer. Deer density ranged from 1 deer per 10 acres in 1995 to 1 deer per 23 acres in 2000 (USAF 2002).

3.3.2.3 Threatened, Endangered and Other Sensitive Species

A list of federally threatened and endangered species that have the potential to occur in Pulaski County is shown in Table 3.3-2. Most of these species are not known to occur on Little Rock AFB. The bald eagle (*Haliaeetus leucocephalus*) and the interior least tern (*Sterna antillarum*) are the only species on this list that have been observed on base. The interior least tern was recently observed (June 15, 2006) at Base Lake (personal communication, Popham 2006). Coordination with USFWS is currently on-going. The bald eagle was observed in the fall of 1998, when an immature was seen to fly over the base. Future occurrences of this species in the area of Little Rock AFB will likely be limited to very sporadic flyovers such as occurred in 1998 (USAF 2002).

Table 3.3-2. Federally Listed Species That Have the Potential to Occur in the Area of Little Rock AFB

Species	***Status*[1]**	***Comments***
Fish		
Leopard darter *Percina pantheria*	T	Not found in any aquatic habitat on base (USAF 2002).
Birds		
Bachman's Warbler *Vermivora bachmanii*	E	Not detected on the base during bird surveys (USAF 2002) and would not occur on base.
Interior Least Tern *Sterna antillarum*	E	Has been observed on base recently (June 15, 2006). Coordination with USFWS is on-going.
Bald Eagle *Haliaeetus leucocephalus*	T	An immature bald eagle observed flying over the base in the fall of 1998 (USAF 2002). May occur very sporadically flying over the base.
Ivory-billed Woodpecker *Campephilus principalis*	E	Thought to be extinct, has been recently observed in eastern Arkansas.
Red-cockaded Woodpecker *Picoides borealis*	E	Not detected on the base and very unlikely to occur because habitat was judged to be unsuitable due the forest composition (mostly oak), its age structure (too few old pines), and physical structure (too much undergrowth) (USAF 1995).
Mammals		
Indiana bat *Myotis sodalis*	E	Not detected on base during bat surveys. Should not occur on base due to the lack of suitable habitat (USAF 2002).

Note: 1. T = threatened, E = endangered
Source: USAF 2002

Ten non-federally listed sensitive species have been detected on Little Rock AFB. Two sensitive species of invertebrates were detected during insect sampling on Little Rock AFB including the Eryngium borer moth (*Papaipema eryngii*) found only in the mesic prairie on base and the Diana fritillary butterfly (*Speyeria diana*) also found in this prairie as well as mesic oak/hickory forest. The alligator snapping turtle (*Macroclemys temminckii*) was found in one stream on base and may occur in other aquatic habitats on base (USAF 2002).

The remaining eight sensitive species are birds and are being monitored by the Arkansas Natural Heritage Commission, PIF, or are on the NAS Watchlist (NAS 2002, PIF 2006). The grasshopper sparrow (*Ammodramus savannarum*) has been observed only during migration while the red-shouldered hawk (*Buteo linaetus*) has been observed in the forest habitat on base but is not believed to be a breeding species. The field sparrow is considered a fairly common permanent resident at Little Rock AFB and is undergoing declines in the Ozark and Ouachitas physiographic region (PIF 2002). This species could occur in the grassland habitat in the project area. The dickcissel (*Spiza americana*) is an uncommon migrant and breeding species in grassland habitat on Little Rock AFB. The prairie warbler (*Dendroica discolor*) and painted bunting (*Passerina versicolor*) are occasional migrant and breeding species in shrub habitat on Little Rock AFB. The Kentucky warbler and Louisiana waterthrush occur primarily in wet woods and are considered fairly common and uncommon on base, respectively (USAF 2002).

3.3.2.4 Wetlands

Wetlands were described and mapped on Little Rock AFB during a 1996-97 wetlands study (USAF 1997a), which was updated by the USACE in 2004. Wetland delineations followed the USACE 1987 wetlands delineation manual (Environmental Laboratory 1987). This study expanded on a wetlands study conducted on Little Rock AFB in 1993 (Woolpert Consultants 1993). According to these data, there are a total of approximately 72 wetland sites covering 346 acres that have the potential to be considered USACE jurisdictional wetlands on Little Rock AFB (USAF 1997a, USAF 2001, personal communication, Love 2006).

3.4 AIR QUALITY

3.4.1 DEFINITION OF THE RESOURCE

Federal Air Quality Standards. Air quality is determined by the type and concentration of pollutants in the atmosphere, the size and topography of the air basin, and local and regional meteorological influences. The significance of a pollutant concentration in a region or geographical area is determined by comparing it to federal and/or state ambient air quality standards. Under the authority of the CAA, the USEPA established nationwide air quality standards to protect public health and welfare, with an adequate margin of safety.

These federal standards, known as the NAAQS, represent the maximum allowable atmospheric concentrations and were developed for six "criteria" pollutants: O_3, NO_2, CO, respirable particulate matter less than or equal to 10 and 2.5 micrometers in diameter (PM_{10} and $PM_{2.5}$, respectively), SO_2, and Pb. The NAAQS are defined in terms of concentration (e.g., parts per million [ppm] or micrograms per cubic meter [$\mu g/m^3$]) determined over various periods of time (averaging periods). Short-term standards (1-hour, 8-hour, or 24-hour periods) were established for pollutants with acute health effects and may not be exceeded more than once a year. Long-term standards (annual periods) were established for pollutants with chronic health effects and may never be exceeded.

Based on measured ambient criteria pollutant data, the USEPA designates areas of the U.S. as having air quality equal to or better than the NAAQS (attainment) or worse than the NAAQS (nonattainment). Upon achieving attainment, areas are considered to be in maintenance status for a period of 10 or more years. Areas are designated as unclassifiable for a pollutant when there is insufficient ambient air quality data for the USEPA to form a basis of attainment status. For the purpose of applying air quality regulations, unclassifiable areas are treated similar to areas that are in attainment of the NAAQS.

The USEPA recently promulgated attainment designations for the newly established 8-hour O_3 standard effective as of June 15, 2004. USEPA revoked the 1-hour O_3 standard on June 15, 2005. On December 17, 2004, the USEPA designated areas as attainment or nonattainment for the newly developed standard for $PM_{2.5}$, which are fine particulates that have not been previously regulated (USEPA 2005).

State Air Quality Standards. Under the CAA, state and local agencies may establish ambient air quality standards and regulations of their own, provided these are at least as stringent as the federal requirements. For the criteria pollutants of concern, Arkansas's standards are the same as the federal standards. Table 3.4-1 summarizes the federal standards associated with criteria pollutants.

State Implementation Plan. For non-attainment regions, the states are required to develop an SIP designed to eliminate or reduce the severity and number of NAAQS violations, with an underlying goal to bring state air quality conditions into (and maintain) compliance with the NAAQS by specific deadlines. The SIP is the primary means for the implementation, maintenance, and enforcement of the measures needed to attain and maintain the NAAQS in each state.

Table 3-4-1. Federal Ambient Air Quality Standards

Air Pollutant	*Averaging Time*	NAAQS	
		Primary	***Secondary***
Carbon Monoxide (CO)	8-hour 1-hour	9 ppm 35 ppm	--- ---
Nitrogen Dioxide (NO_2)	AAM 24-hour	0.053 ppm ---	0.053 ppm ---
Sulfur Dioxide (SO_2)	AAM 24-hour 3-hour	0.030 ppm 0.14 ppm ---	--- --- 0.50 ppm
Particulate Matter (PM_{10})	AAM 24-hr	50 $\mu g/m^3$ 150 $\mu g/m^3$	50 $\mu g/m^3$ 150 $\mu g/m^3$
Particulate Matter ($PM_{2.5}$)[1]	AAM 24-hour	15 $\mu g/m^3$ 65 $\mu g/m^3$	15 $\mu g/m^3$ 65 $\mu g/m^3$
Ozone (O_3)[2]	8-hour	0.08 ppm	0.08 ppm
Lead (Pb) and Lead Compounds	Calendar Quarter	1.5 $\mu g/m^3$	1.5 $\mu g/m^3$

Notes: AAM = Annual Arithmetic Mean; AGM = Annual Geometric Mean.
ppm = parts per million; $\mu g/m^3$ = micrograms per cubic meter.

1. The $PM_{2.5}$ standard (particulate matter with a 2.5 μm diameter or smaller) will be implemented over the next few years. USEPA designated areas as being in attainment or nonattainment of the $PM_{2.5}$ standard in December 2004.
2. The 8-hour O_3 standard replaced the 1-hour standard when the EPA revoked the 1-hour O_3 standard in June 2005.

Prevention of Significant Deterioration. Section 162 of the CAA further established the goal of prevention of significant deterioration (PSD) of air quality in all international parks; national parks which exceeded 6,000 acres; and national wilderness areas which exceeded 5,000 acres if these areas were in existence on August 7, 1977. These areas were defined as mandatory Class I areas, while all other attainment or unclassifiable areas were defined as Class II areas. Under CAA Section 164, states or tribal nations, in addition to the federal government, have the authority to redesignate certain areas as (non-mandatory) PSD Class I areas, *e.g.*, a National Park or national wilderness area established after August 7, 1977, which exceeds 10,000 acres. PSD Class I areas are areas where any appreciable deterioration of air quality is considered significant. Class II areas are those where moderate, well-controlled growth could be permitted. Class III areas are those designated by the governor of a state as requiring less protection than Class II areas. No Class III areas have yet been so designated. The PSD requirements affect construction of new major stationary sources in the PSD Class I, II, and III areas and are a pre-construction permitting system.

Visibility. CAA Section 169A established the additional goal of prevention of further visibility impairment in PSD Class I areas. Visibility impairment is defined as a reduction in the visual range and atmospheric discoloration. Determination of the significance of an activity on visibility in a PSD Class I area is typically associated with evaluation of stationary source contributions. The USEPA is implementing a Regional Haze rule for PSD Class I areas that will address contributions from mobile sources and pollution transported from other states or regions. Emission levels are used to qualitatively assess potential impairment to visibility in PSD Class I areas. Decreased visibility may potentially result from elevated concentrations of PM_{10} and SO_2 in the lower atmosphere. Because no regulatory thresholds for mobile sources exist, the emissions from mobile sources are compared to stationary.

General Conformity. CAA Section 176(c), General Conformity, established certain statutory requirements for federal agencies with proposed federal activities to demonstrate conformity of the proposed activities with each state's SIP for attainment of the NAAQS. Federal activities must not:

(a) cause or contribute to any new violation;

(b) increase the frequency or severity of any existing violation; or

(c) delay timely attainment of any standard, interim emission reductions, or milestones in conformity to a SIP's purpose of eliminating or reducing the severity and number of NAAQS violations or achieving attainment of NAAQS.

General conformity applies only to nonattainment and maintenance areas and applies to both direct and indirect stationary and mobile source emissions. If the emissions from a federal action proposed in a nonattainment area exceed annual thresholds identified in the rule, a conformity determination is required of that action. The thresholds become more restrictive as the severity of the nonattainment status of the region increases.

Stationary Sources Operating Permits. Title V of the CAA Amendments of 1990 also requires states to issue Federal Operating Permits for major stationary sources. Under the Arkansas Air Pollution Control Code (Regulation #18) and the Arkansas Plan of Implementation of Air Pollution Control (Regulation #19), a major stationary source in Pulaski County is a facility (i.e., plant, base, or activity) that emits more than 100 tons per year (TPY) of any criteria pollutant, 10 TPY of a hazardous air pollutant, or 25 TPY of any combination of hazardous air pollutants. The purpose of the permitting rule is to establish regulatory control over large, industrial activities and to monitor their impact upon air quality.

3.4.2 EXISTING CONDITIONS

3.4.2.1 Climate

Little Rock AFB is located in central Arkansas, between the Ouachita Mountains to the west and the flat lowlands to the east. The climate in Pulaski County is described as subtropical humid continental, which is characterized by long, hot, and humid summers and mild winters. Factors influencing Little Rock's weather patterns include moist air masses from the Gulf of Mexico and cool northern winds from the continental plains to the north.

The average summer temperature is 82 degrees Fahrenheit (ºF) with average highs in the nineties and lows in the seventies. Daily high temperatures greater than 100ºF occur frequently. Winters are generally mild with an average temperature of 40ºF, average highs in the high forties and lows around freezing. Low temperatures of 10ºF are not uncommon during arctic outbreaks in January. The average growing season, with temperatures above freezing, is about 233 days.

Precipitation is well distributed throughout the year, with average annual precipitation of 49.2 inches per year and an average of 104 days per year with some form of precipitation. April has the highest average precipitation at 5.3 inches per year; August has the lowest at 3.2 inches per year. Thunderstorms are common, occurring an average of eight days per month from April through August. Snow is rare, with an average amount of 5.4 inches per year. An average of one out of every four winter seasons witness seasonal snowfall accumulations of less than one inch.

3.4.2.2 Regional Air Quality

Little Rock AFB is located in the northeastern portion of Pulaski County, in central Arkansas. Pulaski County, according to 40 CFR 81.138, is part of the Central Arkansas Intrastate Air Quality Control Region (AQCR Number 016). A review of Federally published attainment status for Arkansas in 40 CFR 81.304 indicated that this region is designated as attainment or meeting national standards for all criteria pollutants, including CO, NO_2, SO_2, PM_{10}, $PM_{2.5}$, O_3, and Pb.

Mandatory PSD Class I areas established under the CAA Amendments of 1977 for the state of Arkansas are listed in 40 CFR 81.404. These are areas where visibility has been determined to be an important issue by the Administrator, in consultation with the Secretary of the Interior. According to the USEPA, sulfates and nitrates from utility and industrial boilers are the main pollutants of concern in Arkansas forests (USEPA 2002). The nearest mandatory PSD Class I areas to the region potentially affected by the action alternatives are:



- Caney Creek Wilderness, located in Polk County, Arkansas. This 14,460-acre area is managed by the U.S. Forest Service and is located approximately 100 miles west of Little Rock AFB.

- Upper Buffalo Wilderness, located in Newton County, Arkansas. This 12,018-acre area is managed by the U.S. Forest Service and is located approximately 80 miles northwest of Little Rock AFB.

3.4.2.3 Current Air Emissions

Air emissions at Little Rock AFB are from mobile and stationary sources. The mobile sources include aircraft operations, ground support equipment, and motor vehicles. Stationary sources include boilers, emergency generators, engine test cells, storage tanks, fuel dispensing, surface coating, and solvent degreasing. The Base has a *Minor Source Air Permit* (Permit # 865-AR-6) from the ADEQ in accordance with the Regulations of the Arkansas Operating Air Permit Program (Regulations 18 and 19). A major source permit would be required if the Base exceeded the major source thresholds discussed in Section 3.4.1 under stationary Source Operating Permits. The permit delineates total allowable emissions for the Base and for specific emission units, as well as fuel throughput limitations, paint usage thresholds, and recordkeeping requirements for various significant stationary sources. The permit does not cover mobile sources. In the following tables nitrogen oxides (NO_x) include NO_2 and other nitrogen compounds. Because volatile organic compounds (VOCs) and NO_x are precursors to the formation of O_3 in the atmosphere, control of these pollutants is the primary method of reducing O_3 concentrations in the atmosphere. Table 3.4-2 summarizes the results of a Calendar Year (CY) 2003 stationary source emissions inventory (USAF 2004a).

Table 3.4-3 shows emission estimates for mobile sources based on a CY 2002 mobile source air emissions inventory (USAF 2004b) for all mobile sources other than aircraft operations, which were estimated for CY 2005 based on interviews with base personnel. The aircraft flying operation emissions in the table below were calculated using emission factors and default USAF combat aircraft time-in-mode data for C-130 aircraft equipped with four T56-A-7B engines (O'Brien and Wade 2003). For the purpose of this analysis, project emissions would be considered potentially significant if they exceed one of the major source thresholds. (As noted above, mobile source emissions must be considered in visibility or conformity analyses.) This is a conservative approach, as the project includes both stationary and mobile emission sources, whereas these thresholds only apply to stationary sources.

Table 3.4-2. Little Rock AFB Stationary Source Emissions CY 2004

Stationary Sources	POLLUTANTS (IN TONS PER YEAR)				
	CO	***VOC***	***NO_2***	***SO_2***	***PM_{10}***
Storage Tanks	-	1.1	-	-	-
Boilers (significant)	4.3	0.3	5.1	< 0.1	0.4
Boilers (insignificant)	4.2	0.3	0.1	< 0.1	0.4
Generators	0.5	0.2	2.5	0.2	0.2
Test Cells	0.9	0.3	3.6	0.3	1.0
Fuel Loading	-	0.2	-	-	-
Fuel Dispensing	-	1.0	-	-	-
Abrasive Cleaning	-	-	-	-	< 0.1
Painting	-	0.9	-	-	-
Equipment Leaks	-	0.6	-	-	-
Fuel Cell Maintenance	-	< 0.1	-	-	-
Degreasers	-	0.5	-	-	-
Total Stationary Sources	**9.9**	**5.4**	**11.3**	**0.6**	**1.9**

Note: $PM_{2.5}$ emissions can be estimated in the inventory as being equivalent to PM_{10} emissions.
Source: USAF 2004a

Table 3.4-3. Little Rock AFB Mobile Source Emissions CY 2002

Mobile Sources	POLLUTANTS (IN TONS PER YEAR)				
	CO	***VOC***	***NO_2***	***SO_2***	***PM_{10}***
Aircraft – LTO	151.6	67.6	91.2	11.7	46.8
Aircraft – Closed Patterns	38.6	5.1	71.7	7.5	26.2
Aircraft – Slow Routes	8.5	1.1	35.2	2.9	5.1
Aircraft – All-American Drop Zone	0.6	0.1	2.3	0.2	0.3
Aircraft - Blackjack Drop Zone	0.8	0.1	3.2	0.3	0.5
Engine testing	2.3	1.0	11.8	6.5	137.0
Aerospace Ground Equipment	29.1	16.1	287.5	0.4	8.2
Government owned vehicle on-road	31.0	4.0	7.4	0.3	0.5
Privately owned vehicle on-road	339.5	37.6	23.9	1.3	0.6
Nonroad	159.0	35.4	58.0	7.5	7.1
Fueling	0.0	2.1	0.0	0.0	0.0
Total Mobile Sources	**1021.8**	**238.2**	**1433.5**	**77.0**	**380.8**

Note: $PM_{2.5}$ emissions can be estimated in the inventory as being equivalent to PM_{10} emissions.
Source: USAF 2004b

3.5 AIRSPACE MANAGEMENT AND AIR TRAFFIC CONTROL

3.5.1 DEFINITION OF THE RESOURCE

Airspace management and air traffic control is defined as the direction, control, and handling of flight operations in the "navigable airspace" that overlies the geopolitical borders of the U.S. and its territories. "Navigable airspace" is airspace above the minimum altitudes of flight prescribed by regulations under USC Title 49, Subtitle VII, Part A, and includes airspace needed to ensure safety in the takeoff and landing of aircraft, as defined in FAA Order 7400.2E (49 USC). This navigable airspace is a limited natural resource that Congress has charged the FAA to administer in the public interest as necessary to ensure the safety of aircraft and its efficient use (FAA Order 7400.2E 2000).

The FAA has designated four types of airspace above the U.S. They include: Controlled Airspace, Special Use Airspace (SUA), Other Airspace, and Uncontrolled airspace.

Controlled airspace is categorized into five separate classes: Class A, B, C, D, and E airspace. These classes identify airspace that is controlled, airspace that supports airport operations, and designated airways affording en route transit from place to place. These classes also dictate pilot qualification requirements, rules of flight that must be followed, and the type of equipment necessary to operate within that airspace.

Special Use Airspace is airspace where flight activities are conducted that require confinement of participating aircraft or place operating limitations on nonparticipating aircraft. Prohibited Areas, Restricted Areas, Warning Areas, and Military Operations Areas (MOAs) are examples of SUA.

Other airspace consists of advisory areas, areas that have specific flight limitations or designated prohibitions, areas designated for parachute jump operations, Military Training Routes (MTRs), Slow-speed Training Routes (SRs), low-altitude tactical navigation areas, and Aerial Refueling Tracks.

Uncontrolled Airspace consists of airspace that has no specific requirements associated with its use.

Military training airspace currently used by aircrews at Little Rock AFB includes airspace around the airfield itself, Restricted Areas, and SRs. Use of these airspace units is normally scheduled by the owning/using agency, and is managed by the military or the applicable Air Route Traffic Control Center (ARTCC).

Restricted Areas. A Restricted Area is designated airspace that supports ground or flight activities that could be hazardous to non-participating aircraft. A Restricted Area is airspace

designated under 14 CFR Part 73, within which the flight of aircraft, while not wholly prohibited, is subject to restriction. Most restricted areas are designated "joint-use" and instrument flight rules/visual flight rules (IFR/VFR) operations in the area may be authorized by the controlling Air Traffic Control (ATC) facility when it is not being utilized by the using agency (Pilot Controller Glossary 2004).

Training Routes. Training Routes are airspace of defined vertical and lateral dimensions established for the conduct of low altitude military flight training. They are described by a centerline, with defined horizontal limits on either side of the centerline, and vertical limits expressed as minimum and maximum altitudes along the flight track. Transit between Little Rock AFB and the training areas employs use of SRs. Flight on SRs is limited to a maximum altitude of 1,500 feet above ground level (AGL) and a maximum speed of 250 nautical miles (NM) per hour (knots). SRs are not categorized as MTRs (DoD 2005).

3.5.2 EXISTING CONDITIONS

Airfield. Controlled airspace has been established in the region to manage air traffic surrounding the ROI. Class C airspace extends in a 10-NM radius circle around Little Rock National Airport, and Class D airspace extends in a 5-NM radius circle around Little Rock AFB. These airspace elements overlap each other.

Class C airspace is generally that airspace from the surface to 4,000 feet above the airport elevation (charted in MSL) surrounding those airports that have an operational control tower, are serviced by a radar approach control (RAPCON), and that have a certain number of IFR operations or passenger emplanements. Although the actual configuration of Class C airspace is individually tailored, it usually consists of a surface area with a 5 NM radius, and an outer circle with a 10 NM radius that extends from 1,200 feet to 4,000 feet above the airport elevation (U.S. Department of Transportation/FAA 2001).

Class D airspace is generally that airspace from the surface to 2,500 feet above the airport elevation (charted in MSL) surrounding those airports that have an operational control tower. The configuration of each Class D airspace area is individually tailored and when instrument procedures are published, the airspace will normally be designed to contain the procedures. Arrival extensions for instrument approach procedures may be designated as Class D or Class E airspace (U.S. Department of Transportation/FAA 2001).

ATC at Little Rock AFB is provided by the following agencies:

- Memphis ARTCC (ZME)
- Little Rock Approach Control (LIT)
- Little Rock AFB Control Tower (LRF)

Aircraft flying under IFR at greater than 15,000 feet above MSL are controlled by Memphis Center. LIT approach control provides approach and departure control services to aircraft operating up to 15,000 feet MSL within approximately a 30 NM radius of the radio navigation aid designated as the LIT VORTAC (very high frequency omni range tactical air navigation). LRF tower is responsible for providing ATC service to pilots operating under VFR within the Little Rock AFB Class D Airspace.

LIT provides basic radar service to all aircraft transiting Little Rock AFB. This service consists of safety alerts, traffic advisories, limited radar vectoring when requested by the pilot, and sequencing VFR traffic with IFR and other participating VFR traffic (Little Rock AFB 2004a).

Drop Zones. Additional training resources on Little Rock AFB itself include an Assault Zone (AZ) strip located parallel to and immediately north of the runway, and the Jacksonville Drop Zone (Jax DZ). Jax DZ is located just north of the main runway, and at the west end of the AZ. The Drop Zone (DZ) consists of two separately-surveyed DZs. Jax SKE DZ is used during inclement weather airdrops, while Jax Vis DZ is used for visual airdrops (Little Rock AFB 2004a).

Restricted Airspace R-2403 A/B is located 5 to 9 miles west of Little Rock AFB and can be active up to 16,000 feet above MSL. The Department of the Adjutant General of the Arkansas ANG controls this airspace. Notice to Airmen (NOTAMs) concerning R-2403A or B are found in the Enroute Special Notice section under Memphis ARTCC (Little Rock AFB 2004a).

The All-American Drop Zone (AADZ)/Landing Zone (LZ) is supported by the Restricted Airspace R-2403A, west of Little Rock AFB. The DZ is 5,808 feet long and 3,600 feet wide, and the LZ runway is 3,900 feet long and 60 feet wide (Little Rock AFB 2003). Black Jack Drop Zone (BJDZ) is located 19 miles north-northeast of Little Rock AFB. The DZ is 4,290 feet long and 3,000 feet wide (Little Rock AFB 2003).

Transit between Little Rock AFB and the training areas employs use of SRs (Figure 3.5-1). Flight on SRs is limited to a maximum altitude of 1,500 feet AGL and a maximum speed of 250 NM per hour (knots). SRs are not categorized as MTRs (DoD 2005). Several of the SRs do not serve local DZs. These routes support low altitude flight training to either Fort Chaffee, Arkansas or Fort Campbell, Kentucky.

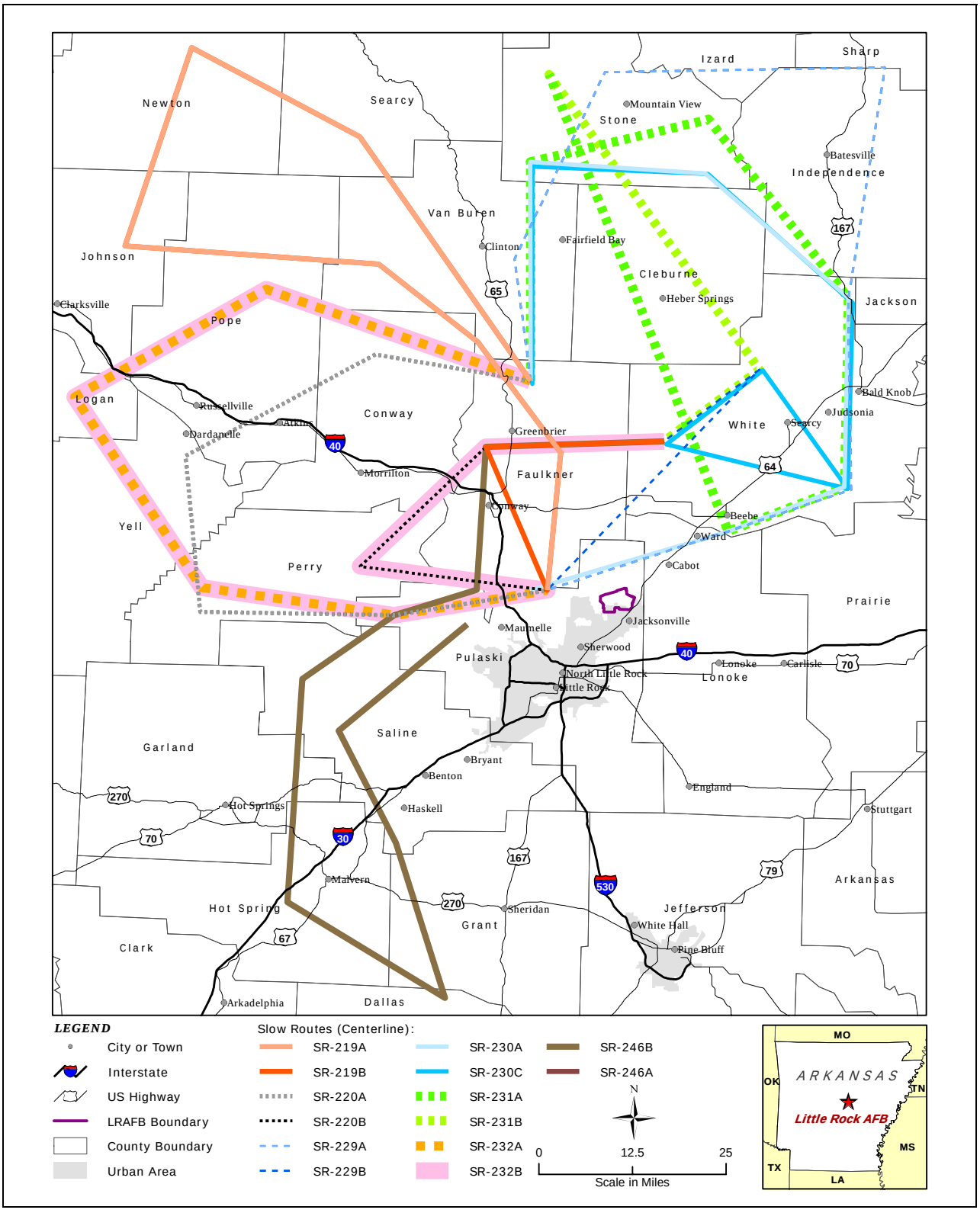


Figure 3.5-1. Slow-speed Training Routes

3.6 NOISE

3.6.1 DEFINITION OF THE RESOURCE

Noise is considered to be unwanted sound that interferes with normal activities or otherwise diminishes the quality of the environment. It may be intermittent or continuous, steady or impulsive. It may be stationary or transient. Stationary sources are normally related to specific land uses, e.g., housing tracts or industrial plants. Transient noise sources move through the environment, either along relatively established paths (e.g., highways, railroads, and aircraft flight tracks around airports), or randomly. There is wide diversity in responses to noise that not only vary according to the type of noise and the characteristics of the sound source, but also according to the sensitivity and expectations of the receptor, the time of day, and the distance between the noise source (e.g., an aircraft) and the receptor (e.g., a person or animal).

The physical characteristics of noise, or sound, include its intensity, frequency, and duration. Sound is created by acoustic energy, which produces minute pressure waves that travel through a medium, like air, and are sensed by the ear drum. This may be likened to the ripples in water that would be produced when a stone is dropped into it. As the acoustic energy increases, the intensity or amplitude of these pressure waves increase, and the ear senses louder noise. The unit used to measure the intensity of sound is the decibel (dB). Sound intensity varies widely (from a soft whisper to a jet engine) and is measured on a logarithmic scale to accommodate this wide range. The logarithm, and its use, is nothing more than a mathematical tool that simplifies dealing with very large and very small numbers. For example, the logarithm of the number 1,000,000 is 6, and the logarithm of the number 0.000001 is -6 (minus 6). Obviously, as more zeros are added before or after the decimal point, converting these numbers to their logarithms greatly simplifies calculations that use these numbers.

The frequency of sound is measured in cycles per second, or hertz (Hz). This measurement reflects the number of times per second the air vibrates from the acoustic energy. Low frequency sounds are heard as rumbles or roars, and high frequency sounds are heard as screeches. Sound measurement is further refined through the use of "A-weighting." The normal human ear can detect sounds that range in frequency from about 20 Hz to 15,000 Hz. However, all sounds throughout this range are not heard equally well. Therefore, through internal electronic circuitry, some sound meters are calibrated to emphasize frequencies in the 1,000 to 4,000 Hz range. The human ear is most sensitive to frequencies in this range, and sounds measured with these instruments are termed "A-weighted," and are shown in terms of A-weighted decibels (dBA).

The duration of a noise event and the number of times noise events occur are also important considerations in assessing noise impacts. As a basis for comparison when noise levels are considered, it is useful to note that at distances of about 3 feet, noise from normal human speech

ranges from 63 to 65 dB, operating kitchen appliances range from about 83 to 88 dB, and rock bands approach 110 dB.

The word "metric" is used to describe a standard of measurement. As used in environmental noise analysis, there are many different types of noise metrics. Each metric has a different physical meaning or interpretation and each metric was developed by researchers attempting to represent the effects of environmental noise.

The metrics supporting the assessment of noise from aircraft operations around Little Rock AFB and construction activities associated with the proposals assessed in this document are the maximum sound level (L_{max}), the Sound Exposure Level (SEL), and Time-Averaged Sound Levels. Each metric represents a "tier" for quantifying the noise environment, and is briefly discussed below.

Maximum Sound Level. The L_{max} metric defines peak noise levels. L_{max} is the highest sound level measured during a single noise event (e.g., an aircraft overflight), and is the sound actually heard by a person on the ground. For an observer, the noise level starts at the ambient noise level, rises up to the maximum level as the aircraft flies closest to the observer, and returns to the ambient level as the aircraft recedes into the distance. Maximum sound level is important in judging a noise event's interference with conversation, sleep, or other common activities.

This document considers noise from aircraft operating around airfields. Around airfields, the primary operational modes of aircraft are departures (take-offs) and arrivals (landings). Table 3.6-1 shows L_{max} values at various distances associated with typical military aircraft operating at Little Rock AFB.

Table 3.6-1. Representative Maximum Sound Levels

	L_{MAX} VALUES (IN DBA) AT VARYING DISTANCES (IN FEET)				
Aircraft/Power Setting	***500***	***1,000***	***2,000***	***5,000***	***10,000***
Takeoff/Departure Operations					
C-130E	90.6	83.7	76.3	65.4	56.0
C-130H	91.5	84.6	77.2	66.3	56.9
C-130J	91.5	84.4	76.8	65.4	56.0
Landing/Arrival Operations					
C-130E	89.3	82.1	74.3	62.4	52.2
C-130H	90.2	83.0	75.2	63.3	53.1
C-130J	90.8	83.6	75.8	64.1	54.3

Source: OMEGA108

Sound Exposure Level. L_{max} alone may not represent how intrusive an aircraft noise event is because it does not consider the length of time that the noise persists. The SEL metric combines intensity and duration into a single measure. It is important to note, however, that SEL does not directly represent the sound level heard at any given time, but rather provides a measure of the total exposure of the entire event. Its value represents all of the acoustic energy associated with the event, as though it was present for one second. Therefore, for sound events that last longer than one second, the SEL value will be higher than the L_{max} value. The SEL value is important because it is the value used to calculate other time-averaged noise metrics. Table 3.6-2 shows SEL values corresponding to the aircraft and power settings reflected in Table 3.6-1.

Table 3.6-2. Representative Sound Exposure Levels

Aircraft/Power Setting	**SEL VALUES (IN DBA) AT VARYING DISTANCES (IN FEET)**				
	500	***1,000***	***2,000***	***5,000***	***10,000***
Takeoff/Departure Operations					
C-130E	95.6	90.5	84.9	76.4	68.8
C-130H	96.5	91.4	85.8	77.3	69.7
C-130J	97.8	92.5	86.6	77.6	70.1
Landing/Arrival Operations					
C-130E	93.6	88.2	82.1	72.7	64.3
C-130H	94.5	89.1	83.0	73.6	65.2
C-130J	95.3	90.0	84.0	74.7	66.7

Source: OMEGA108

Time-Averaged Cumulative Noise Metrics. The number of times noise events occur during given periods is also an important consideration in assessing noise impacts. The "cumulative" noise metrics supporting the analysis of multiple time-varying noise events are the Day-Night Average Sound Level (L_{dn}), the Onset Rate-Adjusted Monthly Day-Night Average Sound Level (L_{dnmr}), and the Equivalent Noise Level (L_{eq}).

Day-Night Average Sound Level. This metric sums the individual noise events and averages the resulting level over a specified length of time. Thus, it is a composite metric which considers the maximum noise levels, the duration of the events, the number of events that occur, and the time of day during which they occur. This metric adds 10 dB to those events that occur between 10:00 p.m. and 7:00 a.m. to account for the increased intrusiveness of noise events that occur at night when ambient noise levels are normally lower than during the day time. This cumulative metric does not represent the variations in the sound level heard. Nevertheless, it does provide an excellent measure for comparing environmental noise exposures when there are multiple noise events to be considered.

Onset Rate-Adjusted Monthly Day-Night Average Sound Level. This metric is a sub-set of the L_{dn} metric. To account for the random and often sporadic nature of military flight training activities in special use airspace, some of the computer programs developed by the USAF to calculate noise levels created by these activities base their calculations on a monthly, rather than a daily, period. Additionally, to consider some of the unique aspects of noise created by low altitude, high-speed flight of military aircraft, up to 11 dBA may be added to the calculated noise levels to account for the rapid onset rate of the noise. This sound measurement metric is termed L_{dnmr}. Disregarding the onset-rate adjustment for a moment, it should be noted that arithmetically, calculations of L_{dnmr} will yield the same result as calculations of L_{dn}, as long as the numbers of sound events, or aircraft operations considered, are normalized to monthly as opposed to daily rates.

Equivalent Noise Level. This metric, also sums all of the individual noise events and averages them over a specified time period. Common averaging times are 8- and 24-hour periods [$L_{eq(8)}$ and $L_{eq(24)}$]. This metric assigns no penalty for the time of the noise event. However, if no noise events occur at night, calculations of L_{dn} and L_{eq} would be identical.

Finally, it should be noted that ambient background noise is not considered in the noise calculations that are presented below. There are two reasons for this. First, ambient background noise, even in wilderness areas, varies widely, depending on location and other conditions. For example, studies conducted in an open pine forest in the Sierra National Forest in California have measured up to a 10 dBA variance in sound levels simply due to an increase in wind velocity (Harrison 1973). Therefore, assigning a value to background noise would be arbitrary. Secondly, and probably most important, is that it is reasonable to assume that ambient background noise in the project's ROI would have little or no effect on the calculated L_{dn}. In calculating noise levels, louder sounds dominate the calculations, and overall, aircraft and other transportation-related noise would be expected to be the dominant noise sources characterizing the acoustic conditions in the region.

Using measured sound levels as a basis, the USAF developed several computer programs to calculate noise levels resulting from aircraft operations. Sound levels calculated by these programs have been extensively validated against measured data, and have been proven to be highly accurate.

In this document, the sound levels calculated for aircraft operations in an airfield environment are all Daily L_{dn}. L_{dn} metrics are the preferred noise metrics of the Department of Housing and Urban Development, the Department of Transportation, the FAA, the USEPA, and the Veteran's Administration.

Ignoring the night-time penalty for the moment, L_{dn} may be thought of as the continuous or cumulative A-weighted sound level which would be present if all of the variations in sound level

which occur over the given period were smoothed out so as to contain the same total sound energy. While L_{dn} does provide a single measure of overall noise impact, it is fully recognized that it does not provide specific information on the number of noise events or the specific individual sound levels which occur. For example, an L_{dn} of 65 dB could result from a very few noisy events, or a large number of quieter events. Although it does not represent the sound level heard at any one particular time, it does represent the total sound exposure. Scientific studies and social surveys have found the L_{dn} to be the best measure to assess levels of community annoyance associated with all types of environmental noise. Therefore, its use is endorsed by the scientific community and governmental agencies (American National Standards Institute 1980, 1988, USEPA 1974, Federal Interagency Committee on Urban Noise 1980, Federal Interagency Committee on Noise 1992).

Additional technical information on the methodology and concept of aircraft noise measurement and modeling, as well as data on noise effects, can be found in Appendix C.

The ROI for the noise assessments is the area around Little Rock AFB that is exposed to elevated noise levels caused by aviation-related noise and other human activities in the region. The ROI is also extended to those areas in proximity to Little Rock AFB that underlie the military training airspace supporting Little Rock AFB operations.

3.6.2 EXISTING CONDITIONS

Public annoyance is the most common concern associated with exposure to elevated noise levels. When subjected to L_{dn} levels of 65 dBA, approximately 12 percent of the persons so exposed will be "highly annoyed" by the noise. At levels below 55 dBA, the percentage of annoyance is substantially lower (less than 3 percent), and at levels above 70 dBA, it is substantially higher (greater than 25 percent) (Finegold et al. 1994). Table 3.6-3 shows the percentage of the population expected to be highly annoyed at a range of noise levels. Over the long term, Little Rock AFB receives, on average, about three noise complaints per month (personal communication, Love, 2006). This would not be considered excessive.

Table 3.6-3. Percentage of Population Highly Annoyed by Elevated Noise Levels

Noise Exposure (L_{dn} in dBA)	***Percent Highly Annoyed***
< 65	< 12
65 – 70	12 – 21
70 – 75	22 – 36
75 – 80	37 – 53
80 – 85	54 – 70
> 85	> 71

Source: Finegold et al. 1994

3.6.2.1 Aircraft Activity at the Base

The following terms are defined to provide a better understanding of how data are developed for input to the various noise models used to calculate noise.

Around an airfield, ***aircraft operations*** are categorized as takeoffs, landings, or closed patterns (which could include activities referred to as touch-and-gos or low approaches). Each takeoff or landing constitutes one operation. A ***closed pattern*** occurs when the pilot of the aircraft approaches the runway as though planning to land, but then applies power to the aircraft and continues to fly as though taking off again. The pilot then flies a circular or rectangular track around the airfield, and again approaches for landing. In some cases the pilot may actually land on the runway before applying power, or in other cases the pilot simply approaches very close to the ground. In either event, since a closed pattern operation essentially consists of a landing and a takeoff, it is considered two operations.

In addition to the main runway, other aviation resources on Little Rock AFB itself include an AZ strip located parallel to and immediately north of the runway, and a DZ, Jax DZ. Jax DZ is located just north of the main runway (Little Rock AFB 2004). Operations on the AZ and DZ are managed by the Little Rock AFB Control Tower, but are not individually tracked. These operations are documented as arrivals, departures, or closed patterns, as applicable, and are included in the overall operations at the airfield.

During FY 2005, Little Rock AFB supported approximately 116,600 aviation operations. This equates to approximately 448 daily operations (Little Rock AFB 2005a). Considering all types of flight activities, a scenario representing an "average day's" operations was developed. The operations considered include arrivals (landings), departures (takeoffs), and closed patterns. Noise calculations consider the frequency of flight operations, runway utilization, and the flight tracks and flight profiles flown by each aircraft. The numbers and types of representative operations considered are shown in Table 3.6-4.

Table 3.6-4. Average Daily Operations at Little Rock AFB[1]

	ARRIVALS		DEPARTURES		CLOSED PATTERNS		
Aircraft	***Day***	***Night***	***Day***	***Night***	***Day***	***Night***	***Total***
Based	71.094	12.175	71.092	12.180	234.312	40.130	440.983
Transient/ Other	3.136	0	3.136	0	1.090	0	7.362
Total	**74.230**	**12.175**	**74.228**	**12.180**	**235.402**	**40.130**	**448.345**

Note: 1. Daily operations are based on averages of annual operations; therefore, numbers do not round.
Source: Little Rock AFB 2005a

These levels and types of activity are then combined with information on climatology, maintenance activities, and aircraft flight parameters, and processed through the USAF's BASEOPS/NOISEMAP (Moulton 1990) computer models to calculate L_{dn}. Once noise levels are calculated, they are plotted on a background map in 5-dB increments from 65 dBA to 85 dBA, as applicable. Noise contours associated with current activities at Little Rock AFB are shown in Figures 3.6-1 and 3.6-2. The land area (in acres) encompassed by each contour and its associated population is shown in Table 3.6-5.

In order to further assess noise exposure from aviation activity, several locations around the base were selected for specific analysis. These locations included a sampling of points in the area around the runways where land uses could be sensitive to elevated noise levels. Noise exposure at these points is shown in Table 3.6-6, and the location of the points is depicted in Figure 3.6-1.

3.6.2.2 Military Training Airspace Noise

Using the USAF's program MR_NMAP, which is specifically designed to consider the unique aspects of flight within elements of military training airspace, the maximum noise levels along the centerline of specific aircraft tracks were calculated. These levels are shown in terms of L_{dnmr}. SRs are corridors described by a center line, with lateral extensions on either side of that centerline. However, studies have shown that aircrews do not always follow a specific ground track when using the SR. Instead, observed flight tracks occur dispersed on either side of the centerline, in a manner that approximates a standard normal distribution based on the route width. As route width increases on either side of the route centerline, the standard deviation associated with the distribution around the centerline increases. Thus, as route width increases, noise on the centerline decreases.

The values presented in Table 3.6-6 reflect the mathematically calculated output of the MR_NMAP model. However, background noise in rural areas is normally considered to be approximately 40 dBA or greater. Therefore, although a value is calculated, any such value equal to, or less than 35 to 40 dBA essentially indicates that there is little or no observable noise contribution from aircraft in the region. These low values are due to the size of the airspace, the relatively limited number of operations, and the altitudes at which these operations are conducted.

While the majority of the SRs have a route width of 10 NM, segments of some are reduced to 4 and 7 NM. Multiple data entries in Table 3.6-7 reflect these varied route widths (DoD 2005).

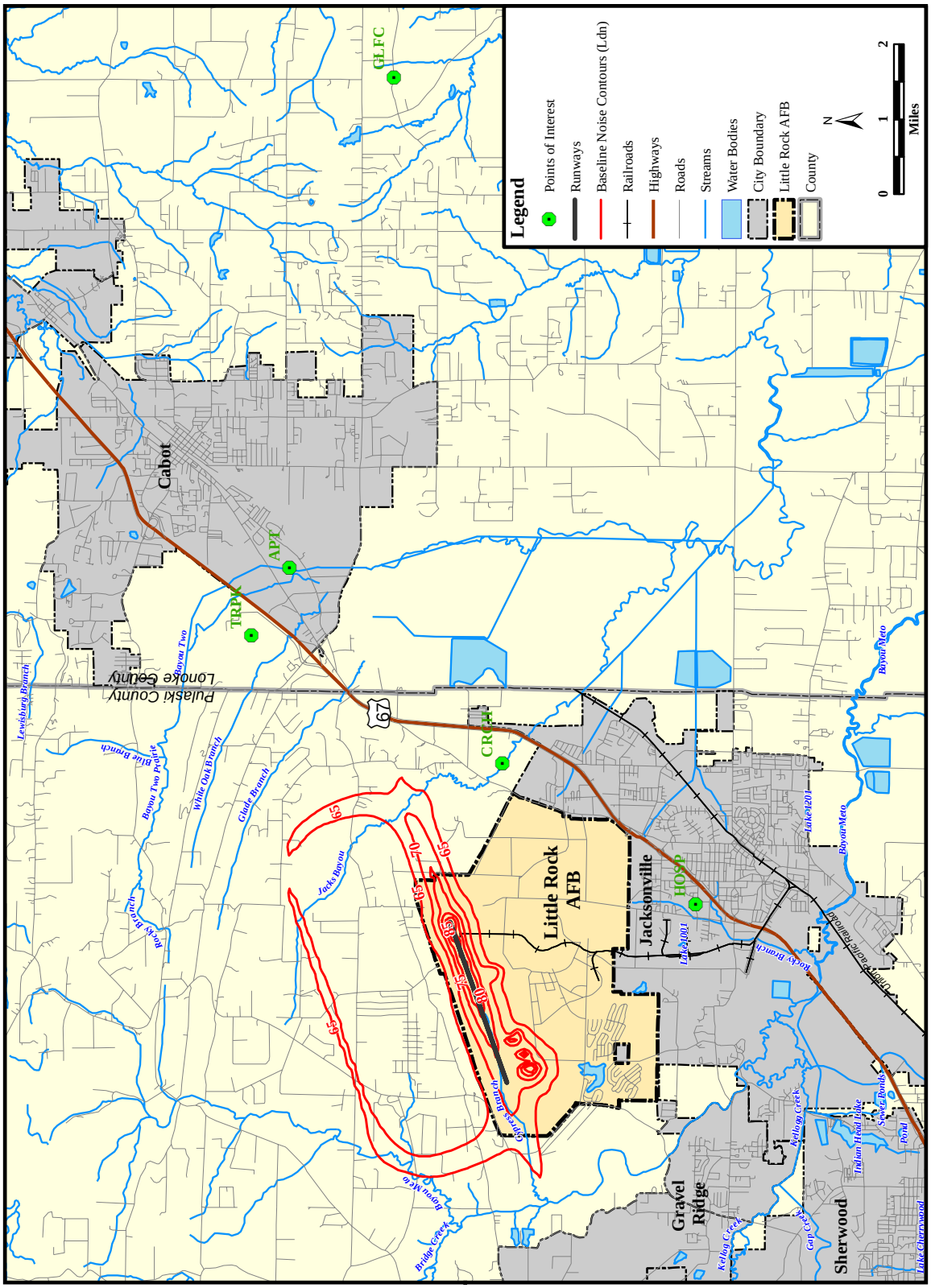


Figure 3.6-1. Noise Contours and Noise Sensitive Receptors in the Vicinity of Little Rock AFB, Arkansas

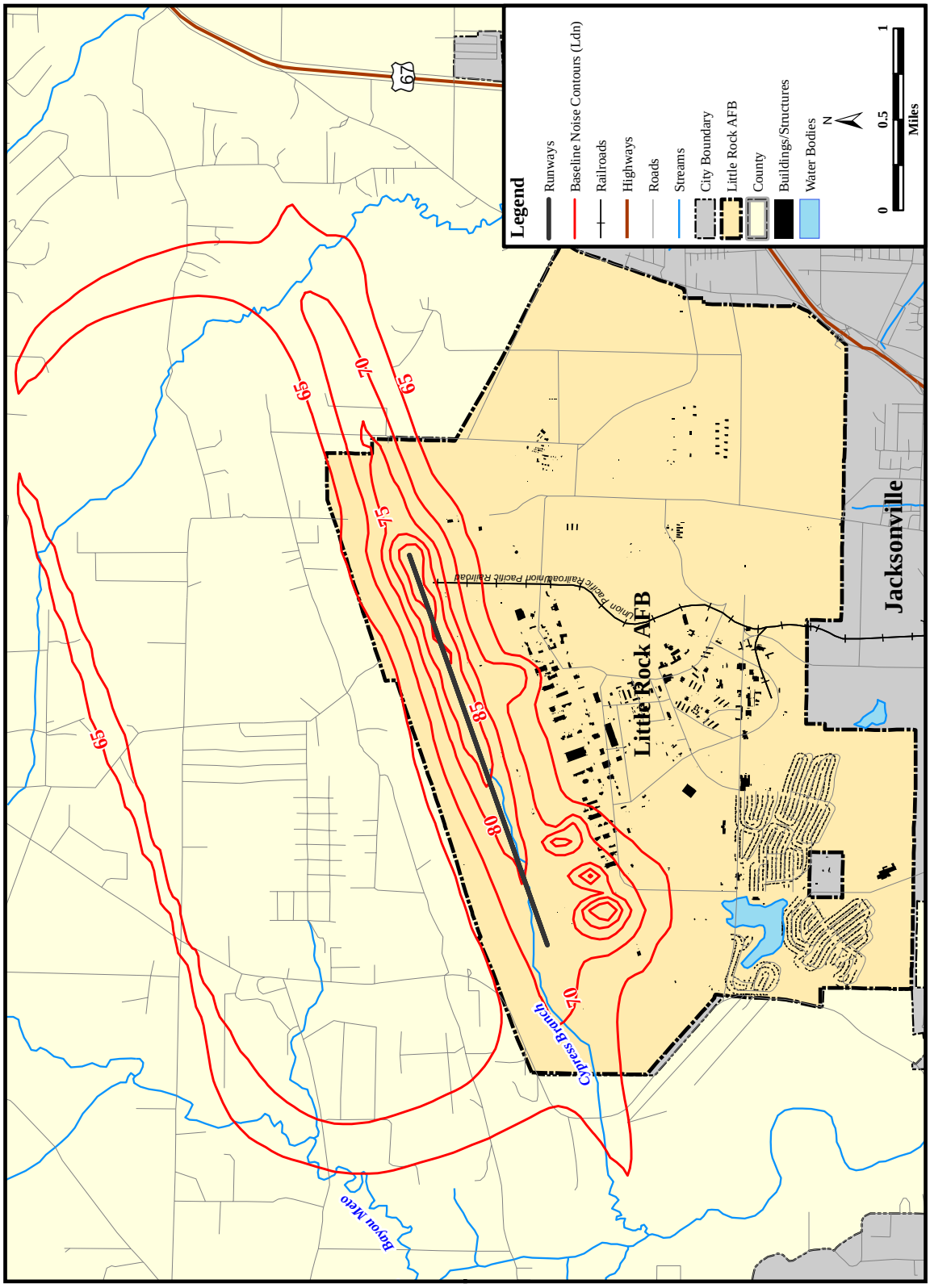


Figure 3.6-2. Noise Contours on Little Rock AFB, Arkansas

Table 3.6-5. Land Areas Exposed to Indicated Sound Levels

Sound Level (In L_{dn})	***Acres of Land Baseline***	***Population Under Contours***
On Base		
65 – 70	728.6	281
70 – 75	550.6	197
75 – 80	243.3	87
80 – 85	120.7	43
> 85	30.2	11
Total	**1,673.4**	**619**
Off Base		
65 – 70	1,250.2	325
70 – 75	118.7	18
75 – 80	3.2	1
80 – 85	0.0	0
> 85	0.0	0
Total	**1,372.1**	**344**
Total Land Area		
65 – 70	1,978.8	606
70 – 75	669.3	215
75 – 80	246.5	87
80 – 85	120.7	43
> 85	30.2	11
Total	**3,045.5**	**963**

Source: Wasmer and Maunsell 2002

Table 3.6-6. Specific Point Noise Exposure

Point ID	***Description***	***Exposure (in L_{dn})***
APT	Apartment Housing	53.0
CRCH	A Church	59.5
GLFC	A Golf Course	34.0
HOSP	A Hospital	42.7
TRPK	A Trailer Park	43.9

Source: Moulton 1990

Table 3.6-7. Noise Levels of Slow Routes Utilized by Little Rock AFB

Route	*Noise Level (In L_{dnmr})*	*Route*	*Noise Level (In L_{dnmr})*
219A	39.6	230C	24.7/27.0
219B	40.7	231A	32.2/33.7
220A	46.2/47.7	231B	34.9/37.2
220B	47.8	232A	44.7/46.2
229A	32.9/34.4	232B	45.9
229B	35.3/36.8/37.6	246A	36.9/38.4
230A	29.3/30.8	246B	37.9

Source: Lucas and Calamia 1996

Noise associated with the use of the two DZs utilized by Little Rock AFB, AADZ and the BJDZ, was assessed using analogous techniques. These DZs are located within the boundaries of Restricted Airspace, but only constitute a small portion of that airspace. Rather than assume random flight throughout the entire Restricted Area, it is more reasonable to assess noise along a track. Aircraft flight over the drop zone during an air drop is much more constrained laterally than along an SR. Therefore, using the USAF's MR_NMAP, a track with a width of zero NM was modeled using the altitude associated with each of the drop zones. The noise levels associated with the drop zones are shown in Table 3.6-8. It should be noted that land areas associated with drop zones are routinely exposed to elevated noise levels, and these levels are not incompatible with the current land use.

Table 3.6-8. Drop Zone Noise Levels

Drop Zone	*Current Noise Level (In L_{dnmr})*
AADZ	62.6
BJDZ	63.9

Notes: AADZ = All American Drop Zone;
BJDZ = Black Jack Drop Zone
Source: Lucas and Calamia 1996

3.6.2.3 Other Ground-Based Activity

Some additional noise results from day-to-day activities associated with operations, maintenance, and the industrial functions associated with the operation of Little Rock AFB, and other commercial activities around the airport. These noise sources include the operation of ground-support equipment, and other transportation noise from vehicular traffic. However, this noise is

generally localized in industrial areas on or near the airfield, or on established lines of communication supporting traffic to-and-from the airfield. Noise resulting from aircraft operations remains the dominant noise source in the airfield region.

3.7 LAND USE AND VISUAL RESOURCES

3.7.1 DEFINITION OF THE RESOURCE

Land use comprises natural conditions or human-modified activities occurring at a particular location. Human-modified land use categories include residential, commercial, industrial, transportation, communications and utilities, agricultural, institutional, recreational, and other developed use areas. The attributes of land use considered in this analysis include general land use patterns, land ownership, land management plans, and special use areas. General land use patterns characterize the types of uses within a particular area including agricultural, residential, military, and recreational. Land ownership is a categorization of land according to type of owner. The major land ownership categories include private, federal, and state. Management plans and zoning regulations determine the type and extent of land use allowable in specific areas and are often intended to protect specially designated or environmentally sensitive areas.

Visual resources, defined as the natural and manufactured features that constitute the aesthetic qualities of an area, are also considered in this section. These features form the overall impression that an observer receives of an area or its landscape character. In undeveloped areas, landforms, water surfaces, and vegetation are the primary components that characterize the landscape. Manmade elements such as buildings, fences, and streets may also be visible. These may dominate the landscape or be relatively unnoticeable. In developed areas, the natural landscape is more likely to provide a background for more obvious manmade features. The size, forms, materials, and functions of buildings, structures, roadways, and infrastructure will generally define the visual character of the built environment. Attributes used to describe the visual resource value of an area include landscape character, perceived aesthetic value, and uniqueness.

The ROI for land use and visual resources includes Little Rock AFB and the area surrounding the base that may be affected by aircraft noise.

3.7.2 EXISTING CONDITIONS

3.7.2.1 Land Use

Little Rock AFB encompasses 6,128 acres and includes a variety of land uses such as industrial, administrative and training areas, housing areas and recreational areas (refer to Figure 2.5-1 in

Appendix B). Table 2.5-1 in Appendix B provides definitions for each of the land use categories depicted.

The open space land use is currently Little Rock AFB's largest category, accounting for 3,290.8 acres, or more than 53 percent of the Base's total acreage. This is because most land that has not been actively utilized under one of the other categories has been defaulted to the open space category. The next largest land use is airfield, with 735 acres, or about 12 percent.

The non-industrial area of the base has administrative office and training buildings; 1,535 family housing units; unaccompanied housing for personnel; an AAFES; three social clubs; a bowling alley; and physical fitness center.

Outdoor recreational facilities consist of softball fields, a batting cage, tennis courts, two swimming pools, a nature trail, Family Camping (FAMCAMP), and an 18-hole golf course. The 39-acre base lake, located in the southwestern quadrant of the base, is the central feature of the MFH area and can be used for non-motor boating and fishing.

The industrial section of the base consists of the airfield and its runway and associated aircraft operations and maintenance areas and includes roughly the northern third of the base.

Little Rock AFB is a federally owned and managed installation located within the city limits of Jacksonville (USAF 2001). Properties immediately surrounding the base are privately owned lands either within the city of Jacksonville (south of Little Rock AFB) or within unincorporated Pulaski County (refer to Figure 1.2-1).

Development of Little Rock AFB is guided by a General Plan (USAF 2001), which provides base leaders with goals and objectives to assist in planning decisions. While it is currently being updated, the plan is intended to provide a framework for effective planning, programming, design, construction, and resource management. In November 2000, the Main Base 20-Year Area Development Plan was prepared, which is a supplement to the General Plan. The vision of this plan was to design a base center that would connect home, work, and leisure (USAF 2001). In addition, in early 2001 the Central Campus Area Development Plan was prepared. This plan combined the elements of the General Plan and the Main Base 20-Year Area Development Plan while incorporating the AETC Design Standards for Installation Excellences (USAF 2001). This plan focuses on development of the central part of the base. A Resource Capability Study for Little Rock AFB was completed in 2005. A follow on study (presented as Appendix B) more fully examined the potential uses of vacant and underutilized parcels on Little Rock AFB. A conceptual future land use map was prepared as part of this study. While it is not an approved future land use plan, it is likely to be approved in the current General Plan update. While there

may be some minor changes during the update process, it is unlikely to have substantive changes (Figure 2.5-2 in Appendix B).

In 2003, an Air Installation Compatible Use Zone (AICUZ) Study was prepared for Little Rock AFB (USAF 2003). The Study documents aircraft operations, including the introduction and operation of C-130J aircraft, and the noise contours associated with those operations. This information is intended to assist local communities and support planning and zoning decisions, so that compatible land development occurs surrounding the military installation. The AICUZ study revealed that land to the northwest of the base in Pulaski County is most affected by flight operations. This area may be characterized as rural, with agricultural areas and scattered residential development. Other off base land uses include agriculture, suburban residential, industrial (along the south central base boundary) and some commercial uses in Jacksonville and along U.S. Highway 167 (southeast of the base) (USAF 2003).

The City of Jacksonville maintains a zoning ordinance and map, as well as a future land use map. Pulaski County does not maintain either. Metroplan, the regional planning agency, monitors local development activity consistent with their transportation planning mission for the region's cities and counties. The AICUZ study evaluated Metroplan data and other relevant planning documents and identified a few residential subdivisions that underlie the L_{dn} 65 to 69 dB contour and the Accident Potential Zones (APZs).

3.7.2.2 Visual Resources

Little Rock AFB is situated in an area of gentle to rolling slopes. Floodplains and wetlands, including lakes and ponds that support some fishing, occur on the base, as well as wooded and forested areas. Little Rock AFB was designated a Tree City USA in 1993. Wildlife including deer and quail may be seen on the installation.

Primarily developed in the mid 20th century, Little Rock AFB adopted the beaux-arts site planning style of axial street layouts, boulevards, and central placement of the Headquarters building (USAF 2001). The installation has an Architectural Compatibility Guide, prepared in 1993, to direct the planning and design of the visual and physical environment of the installation to ensure that an attractive and harmonious design character is achieved (USAF 2001). Consequently, the base maintains a unified harmonious appearance. Efforts have been made to preserve natural site features, respect traditional site planning with sensitive building placement, select appropriate plant materials, and maintain consistency in roof, exterior wall and accent treatments.

3.8 SOCIOECONOMICS

3.8.1 DEFINITION OF THE RESOURCE

Socioeconomic resources are defined as the basic attributes associated with the human environment, generally including factors associated with regional demographics and economic activity. Demographics typically are described by the number, distribution, and composition of population and households. Economic activity is depicted by the region's major industries, employment, and income characteristics. Direct impacts to any of these factors may generate secondary effects on other factors, resulting in a series of potential socioeconomic ramifications within the affected area. The ROI for socioeconomics includes Pulaski County in Arkansas, with particular emphasis on Little Rock AFB and the City of Jacksonville.

Concern that certain disadvantaged communities may bear a disproportionate share of adverse health and environmental effects compared to the general population led to the enactment in 1994 of EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*. This EO directs federal agencies to address disproportionate environmental and human health effects in minority and low-income communities, and 32 CFR 989, *Environmental Impact Analysis Process*, addresses the need for consideration of environmental justice issues in compliance with NEPA. EO 12898 applies to federal agencies that conduct activities that could substantially affect human health or the environment. The evaluation of environmental justice is designed as follows:

- To focus attention of federal agencies on the human health and environmental conditions in minority communities and low-income communities with the goal of achieving environmental justice.

- To foster non-discrimination in federal programs that may substantially affect human health or the environment.

- To give minority communities and low-income communities greater opportunities for public participation in, and access to, public information on matters relating to human health and the environment.

EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks*, was enacted in 1997. EO 13045 directs federal agencies to identify and assess environmental health and safety risks to children, coordinating research priorities on children's health, and ensuring that their standards take into account special risks to children. Children are more sensitive than the adult population to certain environmental effects, such as airborne asbestos and lead paint exposures from demolition, safety with regard to equipment, accidents within structures under

demolition, and noise. Activities occurring near areas that tend to have a higher concentration of children than the typical residential area during any given time, such as schools, churches, and community childcare facilities may further intensify potential impacts to children.

The analytical methods applied in this section are in accordance with the *Interim Guide for Environmental Justice with the Environmental Impact Analysis Process* (USAF 1997b). Minority, low-income, and youth populations are defined as follows:

- *Minority Population*: Blacks, American Indians, Eskimos, Aleuts, Asians, Pacific Islanders, and persons of Hispanic or Latino origin of any race.
- *Low-Income Population*: Persons living below the poverty level, based on a 2000 equivalent annual income of $17,603 for a family of four persons.
- *Youth Population*: Children under the age of 18 years.

Data from the 2000 Census of Population on race, ethnicity, poverty status, and age were collected for the City of Jacksonville and Pulaski County. In addition, general demographic profiles for the State of Arkansas and the U.S. were compiled to provide analytical context.

3.8.2 EXISTING CONDITIONS

Little Rock AFB is located in central Arkansas, adjacent to the City of Jacksonville in Pulaski County, approximately 15 miles north of Little Rock. The base is comprised of 6,128 acres, including two active runways, various facilities, and housing (see Figure 1.2-2). While the base does provide some on-base housing and services, many additional services for base personnel and their dependents are provided in Jacksonville, including off-base housing, schools, and other public services. Little Rock AFB accounts for about 45 percent of the Jacksonville population.

3.8.2.1 Population and Housing

The baseline population associated with Little Rock AFB is 13,466 persons, including 5,919 military personnel, 6,303 military dependents, 525 appropriated fund civilian personnel, and 719 non-appropriated fund civilians, contractors and private business employees (USAF 2006). As presented in Table 3.8-1, it is estimated that 24 percent of the Little Rock AFB population resides on base, including 1,572 personnel and 1,624 dependents. The remaining 76 percent reside off base, comprised of 5,591 personnel and 4,669 dependents.

Table 3.8-1. Little Rock AFB Baseline Population

	Living On-Base	***Living Off-Base***	***Total***
Appropriated Fund Military	1,572	4,347	5,919
Military Dependents	1,634	4,669	6,303
Appropriated Fund Civilians		525	525
Non-Appropriated Fund Civilians		719	719
Total	**3,206**	**10,260**	**13,466**

Source: USAF 2006

The current MFH inventory at Little Rock AFB includes 1,229 units (USAF 2006). Of this total, 382 are two-bedroom units, 566 have three bedrooms, and 281 have four bedrooms, for a total capacity of 3,586 bedrooms. Currently, 1,089 military personnel reside in MFH. Unaccompanied housing at Little Rock AFB includes 678 permanent party dormitory rooms, 152 double occupancy student dorms, 221 single occupancy transient military units, and 50 accompanied transient military units. Currently, 448 military personnel, 35 trainees, and 255 transient personnel reside on base.

The City of Jacksonville has a population of 29,916 persons, comprising less than 10 percent of Pulaski County's population. Between 1990 and 2000, Jacksonville experienced an increase in population of just 2.6 percent. The population of Pulaski County increased by 3.4 percent between 1990 and 2000, and has a current population of 357,663 persons. By comparison, the population of the State of Arkansas increased by 13.7 percent during the prior decade, reaching a current population of 2,725,714 persons (U.S. Census Bureau 2006, U.S. Census Bureau 2004a).

According to the Census, there were a total of 167,538 housing units in Pulaski County in 2004. The vacancy rate is 9.5 percent, and the home ownership rate is 55.9 percent. There are 151,605 households in Pulaski County, yielding an average household size of 2.36 persons, compared to 2.49 for the state (U.S. Census Bureau 2004b). The City of Jacksonville has 11,890 housing units, of which 8.4 percent are vacant and 47.3 are owner-occupied. There are 10,890 households in Jacksonville, with an average household size of 2.64 persons.

3.8.2.2 Employment and Income

Little Rock AFB provides an important economic contribution to the economies of Jacksonville and Pulaski County. The base employs 7,163 direct personnel, including both military and civilian, with an associated payroll of $298 million (Little Rock AFB 2005b). Base activity generates an additional 3,068 indirect jobs and $105 million of related income in the region. Contracts for services and purchases of supplies and equipment amount to $177 million annually.

The total annual economic impact generated by Little Rock AFB activities is estimated at $580 million (Little Rock AFB 2005b).

The civilian labor force in Jacksonville includes 12,757 persons, of whom 11,951 are employed. The unemployment rate is 6.3 percent. Median household income is $35,460 and persons below the poverty level represent 14.2 percent of the population (U.S. Census Bureau 2006). The civilian labor force in Pulaski County includes 182,401 persons, of whom 172,712 are employed. The unemployment rate is 5.3 percent. Median household income is $39,244 and persons below the poverty level represent 15.1 percent of the population (U.S. Census Bureau 2006).

Local, state, and federal government have been the region's major employers for many years. In terms of private employment, primary industries in Pulaski County are educational, health and social services, retail trade, and leisure and hospitality (U.S. Census Bureau 2004b). Among the most common occupations in the county are management and professional, sales and administrative, and service jobs. The top ten employers in the region include: State of Arkansas, Federal Government, Pulaski County Public Schools, Baptist Health, Little Rock AFB, University of Arkansas Medical Sciences, Ryerson-Tull Metals, St. Vincent Medical Center, ALLTEL Corporation, and Timex Corporation (U.S. Census Bureau 2006).

3.8.2.3 Environmental Justice

Table 3.8-2 identifies total population and percentage populations of concern in Jacksonville City, Pulaski County, the State of Arkansas, and the U.S. The total 2000 population for Jacksonville was 29,916 persons. Pulaski County had a 2000 population of 361,474 persons, representing 13.5 percent of the Arkansas population of 2,673,400 persons. Population density in Jacksonville is 1,134 persons per square mile, compared to 468.9 persons per square mile in Pulaski County overall. By comparison, the State of Arkansas has an overall population density of 51.3 per square mile, reflecting the relatively dense population in the region surrounding Little Rock AFB.

Table 3.8-2. Total Population and Populations of Concern (2000)

	Total Population	***Percent Minority***	***Percent Low-Income***	***Percent Youth***	***Population Density[1]***
City of Jacksonville	29,916	32.8	13.6	29.0	1134.2
Pulaski County	361,474	37.1	13.0	25.2	468.9
State of Arkansas	2,673,400	21.4	15.4	25.4	51.3
United States	281,421,906	30.9	12.4	25.7	79.6

Notes: 1. Population density is calculated as average persons per square mile.
Source: U.S. Bureau of the Census 2000a, 2000b, 2000c.

The proportion of minority residents in the region associated with the Proposed Action and alternatives is somewhat higher than at the state level. Minority persons represent 32.8 percent of the Jacksonville population and 37.1 percent of Pulaski County, compared to 21.4 percent of the state population. Blacks are the predominant minority group in the area, accounting for about three-quarters of the minority population at the city, county, and state levels.

The incidence of poverty in the affected region is marginally lower than state levels. Individuals living below the poverty level account for 13.6 percent of the population in Jacksonville and 13.0 percent in Pulaski County compared to 15.4 percent in Arkansas as a whole.

The youth population, comprised of children under the age of 18 years, is relatively consistent throughout the region, with no known concentrated areas of concern where youth might experience special health or safety risks. In Jacksonville and Pulaski County, children constitute 29.0 percent and 25.2 percent of the population, respectively, compared to 25.4 percent for Arkansas overall.

3.9 CULTURAL RESOURCES

3.9.1 DEFINITION OF THE RESOURCE

Cultural resources are any prehistoric or historic district, site, or building, structure, or object considered important to a culture, subculture, or community for scientific, traditional, religious or other purposes. They include archaeological resources, historic architectural and engineering resources, and traditional resources. Cultural resources are protected by federal law when they meet established criteria for listing on the NRHP. Such properties require consideration regarding adverse impacts from a proposed undertaking. Both archaeological and architectural resources must be evaluated in light of four NRHP eligibility criteria. The criteria that prehistoric or historic sites, districts, buildings or structures must meet are as follows (36 CFR 60.4):

a. Properties are associated with events that have made a significant contribution to the broad patterns of our history.

b. Properties are associated with the lives of significant persons in our past.

c. Properties that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction.

d. Properties that have yielded, or may be likely to yield, information important to prehistory or history.

On 21 November 1999, the DoD promulgated its Native American and Alaska Native Policy, which emphasizes the importance of respecting and consulting with tribal governments on a government-to-government basis. The Policy requires an assessment, through consultation, of the affect of proposed DoD actions that may have the potential to significantly affect protected tribal resources, tribal rights, and Indian lands before decisions are made by the services. The ROI for cultural resources consists of the sites where proposed construction would occur.

3.9.2 EXISTING CONDITIONS

3.9.2.1 Historical Setting

The Little Rock AFB region has been inhabited for at least 12,000 years. It was first occupied by small nomadic bands that hunted large game and gathered wild plant foods. As the climate warmed, and large game animals declined, people became more dependent on deer and a variety of nuts and other plant foods. Eventually native seed plants were cultivated and settlement became more stationary, concentrating in the bottomlands and river valleys (USAF 2005). Ceramics were introduced and long-distance trade of raw materials and artifacts increased, as did population. With the introduction of maize cultivation, larger villages, with mounds and other earthworks developed (USAF 2005).

In the mid-1500s, Spanish explorers recorded complex societies in the region that were no longer present 130 years later (USAF 2005). The French encountered the Quapaw people, a southeastern Siouan group who left the Ohio Valley in the early 1600s and moved down the Mississippi River into Arkansas where they were known to other tribes as "Ugaxpa," or "downstream people." They settled four villages at the mouth of the Arkansas River where they remained until they were displaced by Euroamericans (Quapaw Tribal Office 2006). The French remained allies with the Quapaw through the Seven Years' War (French- Indian War) when France ceded all land west of the Mississippi to the Spanish (1762). Spanish rule was marked by Spanish and English competition for the allegiance of the Quapaw (Quapaw Tribal Office 2006). In 1818, the U.S. government was granted a cession of land encompassing all of what is now southern Arkansas, Oklahoma, and part of Louisiana from the Quapaw. Land speculators petitioned the government to remove the Quapaw, and in 1824, the state terminated all Quapaw claims to Arkansas lands (Quapaw Tribal Office 2006). The Quapaw were removed from their homeland to the Red River in northwestern Louisiana where they joined the Caddo temporarily. In 1833, the Quapaw signed another treaty removing them from Arkansas for the last time to northeastern Indian Territory in Oklahoma (Quapaw Tribal Office 2006).

Active Euroamerican settlement in the Pulaski County area began after the Louisiana Purchase in 1803. The population grew slowly and the area remained primarily agricultural (USAF 2005). The Jacksonville-Gray township area was established in 1820-21 (Jacksonville Chamber of Commerce 2006). After Arkansas became a state in 1836, the area continued to grow. During the Civil War, Union forces came through the area on the way to an assault on Little Rock in 1863 (Jacksonville Chamber of Commerce 2006). Jacksonville expanded during the 1870s after a right-of-way was granted to the Cairo and Fulton Railroad Company and lots were established along both sides of the railway. By 1892, Jacksonville had a population of 200, which was maintained for many years.

In the Depression of the 1930s, the Civilian Conservation Corps, Camp Jacksonville, provided construction employment for many area men. The Arkansas Ordnance Plant (AOP), a fuse and detonator manufacturing plant built in 1941, provided employment for thousands. At its peak, the plant employed 13,500 (Jacksonville Chamber of Commerce 2006). Pulaski County received a total of $137 million in war contracts between 1940 and 1945. The ordnance plant ceased operations at the close of the war in 1945 and the town was left without employment for much of its population (Jacksonville Chamber of Commerce 2006).

After the war, AOP land and facilities were sold to a number of parties. The Federal government retained the northern part of AOP land. This parcel later became part of Little Rock AFB (USAF 2001). In 1952, the USAF announced plans to build a $31 million jet bomber base near Jacksonville and Little Rock AFB opened in 1955. The base was assigned to the Strategic Air Command with the 70th Reconnaissance Wing as the first assigned unit (USAF 2001). In 1956, the first B-47 medium bombers arrived. The 308th Strategic Missile Wing assumed operational command of 18 Titan II missile sites located around central Arkansas in 1962. The 64th Tactical Airlift Wing took over the base and the first C-130 arrived in 1970. In 1971, the 314th Tactical Airlift Wing (314 TAW) moved from a base in Taiwan to Little Rock (USAF 2001).

As the Cold War continued, Little Rock AFB was transferred from Tactical Air Command to Military Airlift Command, continuing to operate as both an airlift command and missile control center into the 1980s. With the deactivation of the Titan II missile program, the 314 TAW continued to provide military and humanitarian airlift support around the world. After the Cold War, the 314 TAW, now redesignated the 314 AW, and Little Rock AFB were realigned successively to Air Mobility Command, Air Combat Command, and in 1997 to AETC (USAF 2005).

3.9.2.2 Identified Cultural Resources

A survey of all accessible portions of the base recorded a total of 38 archaeological sites (USAF 2005). None of these sites is listed on the NRHP (National Register Information Service 2006).

One historic site (3PU434) has been recorded in the vicinity of the Test Cell Facility project, which includes an addition and paving of the Test Cell Road. This archaeological site is associated with rural settlement during the mid 20th century, has poor integrity, and is considered not eligible for the NRHP (USAF 2005). Another historic site (3PU438) is near the Contractor Staging Road slated for construction. This site is a 20th century trash dump, also has poor integrity, and is not eligible for the NRHP.

The majority of the surface of Little Rock AFB has been modified, altered, or covered by urban development. However, some areas remain sensitive for the presence of archaeological resources: "undisturbed reaches along Cypress Branch, the area west of the runway, and the small unnamed drainage in the southeastern portion of the base" (USAF 2005). Less sensitive but still of some concern for the presence of archaeological sites are, "the small drainages in the southwestern portion of the base, the portion of Rocky Creek between Arnold Drive and the southern boundary of the base, and the small unnamed drainage in the east central portion of the base, between the eastern edge of the former AOP and the eastern boundary of the base" (USAF 2005).

A building inventory of Little Rock AFB identified more than 90 buildings with the potential to be historic resources. Although the building inventory originally found several buildings with direct connections to the Cold War to be eligible for the NRHP, only one of these still retains its integrity and is considered eligible. Building 258 is an aircraft shelter, and is eligible under Criterion Consideration G for its exceptional Cold War significance, under Criterion A for its association with Strategic Air Command bomb alert operations (USAF 2005). Another 25 buildings have been identified as having the potential to be determined NRHP-eligible when re-evaluated in 2012 (USAF 2005) (Table 3.9-1).

No traditional resources have been identified at the base (USAF 2005). There are no known federally-recognized Native American lands or resources in the area of the Proposed Action. The Quapaw Indian Tribe, the Caddo Indian Tribe of Oklahoma, and the Tunica-Biloxi Indians of Louisiana, Inc., have been contacted regarding this action. Coordination with SHPO is on-going.

Table 3.9-1. NRHP-Eligible and Potentially NRHP-Eligible Buildings at Little Rock AFB

Facility Number	***Description***	***Year***	***NRHP status***
258	**Shop A/Se Storage Fclt ca.**	**1963**	**Eligible**
10	Pump Station, LF	1956	Potentially eligible at 50 years
70	Pump Station, LF	1955	Potentially eligible at 50 years
222	Maintenance Dock, Fl Sys	1956	Potentially eligible at 50 years
245	Maintenance Dock, M/A	1956	Potentially eligible at 50 years
251	Water FR PUMP STATION	1955	Potentially eligible at 50 years
950	Chapel Center	1956	Potentially eligible at 50 years
1704	Sp Operations	1956	Potentially eligible at 50 years
1706	Sp Entry Con Bldg.	1956	Potentially eligible at 50 years
1710	Shop, SRVLL INSP	1955	Potentially eligible at 50 years
1720	Storage, Mag Ag A,B&C	1956	Potentially eligible at 50 years
1722	Storage Spare Inert	1956	Potentially eligible at 50 years
1724	Storage, Seg Mag	1956	Potentially eligible at 50 years
1726	Storage Spare Inert	1956	Potentially eligible at 50 years
1730	Storage, Mu-Cub Mag	1960	Potentially eligible at 50 years
1740	Storage, Igloo	1955	Potentially eligible at 50 years
1744	Storage, Igloo	1955	Potentially eligible at 50 years
1748	Storage, Igloo	1956	Potentially eligible at 50 years
1750	Storage, Igloo	1956	Potentially eligible at 50 years
1754	Storage, Igloo	1956	Potentially eligible at 50 years
1760	Storage, Igloo	1955	Potentially eligible at 50 years
1764	Storage, Igloo	1956	Potentially eligible at 50 years
1768	Storage, Igloo	1956	Potentially eligible at 50 years
1772	Storage, Igloo	1956	Potentially eligible at 50 years
1774	Storage, Igloo	1956	Potentially eligible at 50 years
1776	Storage, Igloo	1956	Potentially eligible at 50 years

Source: USAF 2005, Appendix E

3.10 SAFETY

3.10.1 DEFINITION OF THE RESOURCE

This section addresses ground, explosive, anti-terrorism/force protection (AT/FP) considerations, and flight safety associated with activities conducted by the 314 AW and associated units at Little Rock AFB. Ground safety considers issues associated with human activities, and operations and maintenance activities that support unit operations. Explosive safety discusses the management and use of ordnance or munitions associated with installation operations and training activities. Flight safety considers aircraft flight risks such as aircraft accidents. AT/FP considerations involve measures taken to protect personnel and facilities by minimizing susceptibility to attack.

The ROI for safety is Little Rock AFB, the lands immediately adjacent to the airfield, and the regions associated with the military training airspace which supports flight activities.

3.10.2 EXISTING CONDITIONS

3.10.2.1 Ground Safety

Ongoing operations and maintenance activities conducted at Little Rock AFB are performed in accordance with applicable USAF safety regulations, published USAF Technical Orders, and standards prescribed by Air Force Occupational Safety and Health (AFOSH) requirements.

The 314 AW fire department provides fire and crash response at Little Rock AFB. The unit has a sufficient number of trained and qualified personnel, and possesses all equipment necessary to respond to aircraft accidents and structure fires. There are no response-equipment shortfalls. The 314 AW fire department is party to a mutual support agreement with the city of Jacksonville fire department, which would provide additional support if necessary (personal communication, Ramirez 2005).

To minimize the results of a potential accident involving aircraft operating from Little Rock AFB, CZs, APZs, and safety zones have been established around the airfield (Figure 3.10-1). Within clear and safety zones, construction is either prohibited (CZs) or limited in terms of placement and height (safety zones). Areas around the airfield where experience has shown most aircraft accidents occur are designated as APZs.

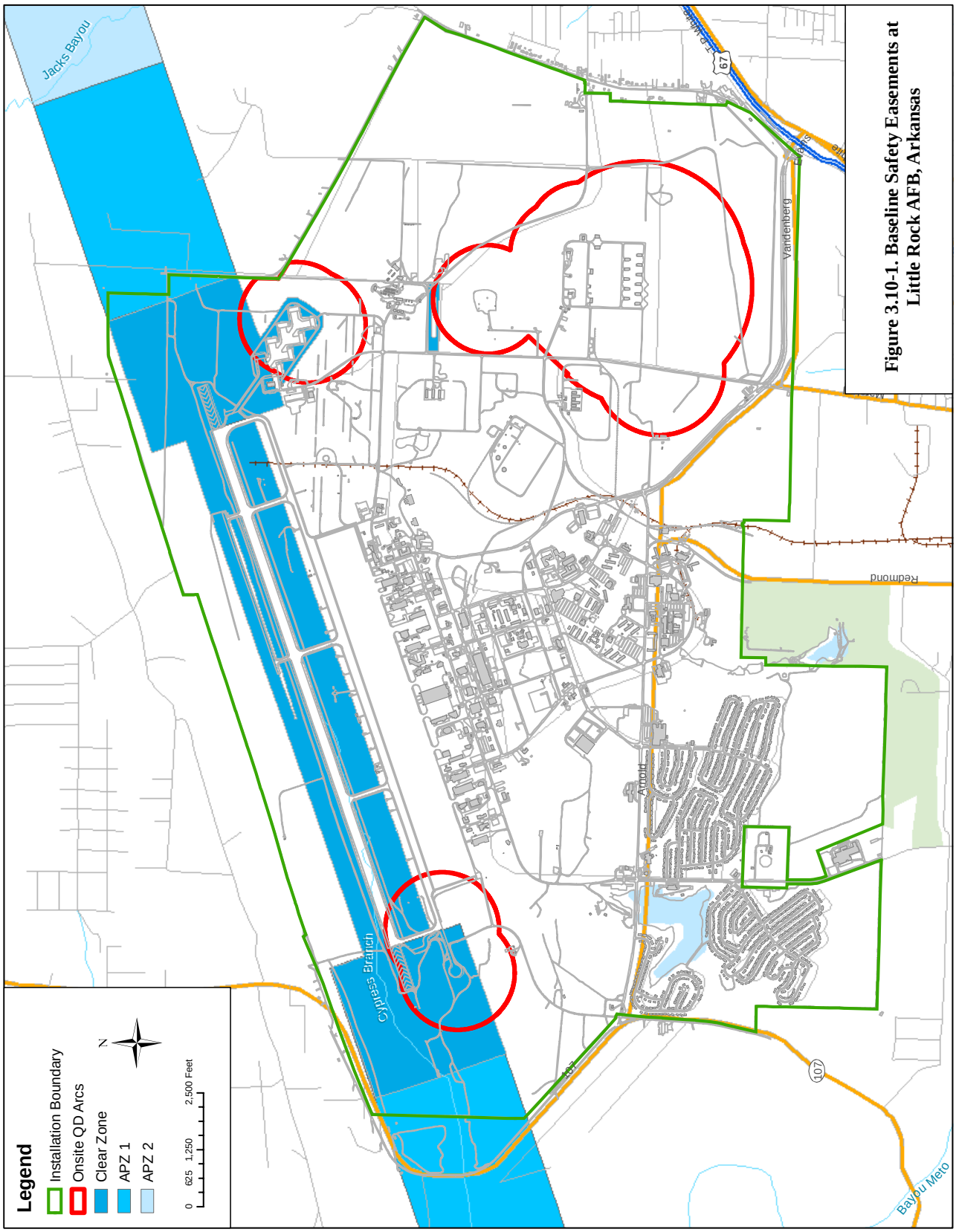


Figure 3.10-1. Baseline Safety Easements at Little Rock AFB, Arkansas

CZs and APZs are surface areas, described geographically on the ground. Specific dimensions, geophysical and topographic standards, and approved land uses are discussed in detail in Unified Facilities Criteria (UFC) 3-260-01, *Airfield and Heliport Planning and Design*; AFI 32-7063*;* and Air Force Handbook 32-7084.

UFC 3-260-01 is a manual incorporating all DoD airfield and heliport requirements and provides standardized airfield, heliport, and airspace criteria for the geometric layout, design and construction of runways, helipads, taxiways, aprons, and related permanent facilities to meet sustained [aviation] operations (Air Force Civil Engineer Support Agency [AFCESA] et al. 2001).

The UFC also specifies requirements for imaginary surfaces on and around the runway. These criteria specify encroachment-free standards along and on either side of the runway (AFCESA et al. 2001).

On Little Rock AFB, there are unresolved corrections to airfield terrain and topography necessary to bring the airfield into conformity with UFC 3-260-01 (personal communication, Thompson 2005); however, these corrections are underway.

3.10.2.2 Explosives Safety

All activities associated with the receipt, processing, transportation, storage, maintenance, and loading of munitions items is accomplished by qualified technicians in accordance with DoD and USAF technical procedures. The 314 AW has sufficient storage facilities and space for the storage and processing of mission-required ordnance items (personal communication, Ramirez 2005). There are no explosive safety waivers in effect at Little Rock AFB (personal communication, Ramirez 2005).

The only ordnance stored on Little Rock AFB consists of small-arms ammunition, and chaff and flares. Neither chaff nor flares are expended in the military training airspace regularly used by assigned aircrews. Chaff and flares are only expended on the range at Fort Chaffee (personal communication, Simmons 2005).

There are three “hot cargo” pads on the installation, which are sufficient for handling explosive cargo. The primary pad is located southeast of the landing end of Runway 25. The other two pads are located south of the landing end of Runway 07.

If required, support for explosive ordnance disposal is provided by an active duty USAF unit stationed at Little Rock AFB (personal communication, Ramirez 2005).

3.10.2.3 Flight Safety

The primary public concern with regard to flight safety is the potential for aircraft accidents. Such mishaps may occur as a result of weather-related accidents, mechanical failure, pilot error, mid-air collisions, collisions with manmade structures or terrain, or bird-aircraft collisions. Flight risks apply to all aircraft; they are not limited to the military.

The USAF defines four major categories of aircraft mishaps: Classes A, B, C, and E, which for the purposes of this analysis includes High Accident Potential (HAP). Class A mishaps result in a loss of life, permanent total disability, a total cost in excess of $1 million, or destruction of an aircraft. Class B mishaps result in total costs of more than $200,000, but less than $1 million and result in permanent partial disability or inpatient hospitalization of three or more personnel. Class C mishaps involve reportable damage of more than $20,000, but less than $200,000; an injury resulting in any loss of time from work beyond the day or shift on which it occurred, or occupational illness that causes loss of time from work at any time; or an occupational injury or illness resulting in permanent change of job. HAP events are any hazardous occurrence that has a high potential for becoming a mishap. Class C mishaps and HAP, the most common types of accidents, represent relatively unimportant incidents because they generally involve minor damage and injuries, and rarely affect property or the public (USAF 2004c). This EA will focus on Class A mishaps because of their potentially catastrophic results.

Based on historical data on mishaps at all installations, and under all conditions of flight, the military services calculate Class A mishap rates per 100,000 flying hours for each type of aircraft in the inventory. It should be noted that these mishap rates do not consider combat losses due to enemy action. In evaluating this information, it should be emphasized that data presented are only statistically predictive. The actual causes of mishaps are due to many factors, not simply the amount of flying time of the aircraft.

Aircraft Mishaps. It is impossible to predict the precise location of an aircraft accident, should one occur. Major considerations in any accident are loss of life and damage to property. The aircrew's ability to exit from a malfunctioning aircraft is dependent on the type of malfunction encountered. The probability of an aircraft crashing into a populated area is extremely low, but it cannot be totally discounted. Several factors are relevant: the ROI and immediate surrounding areas have relatively low population densities; pilots of aircraft are instructed to avoid direct overflight of population centers at very low altitudes; and the limited amount of time the aircraft is over any specific geographic area limits the probability that impact of a disabled aircraft in a populated area would occur.

Secondary effects of an aircraft crash include the potential for fire or environmental contamination. Because the extent of these secondary effects is situationally dependent, they are

difficult to quantify. The terrain overflown in the ROI is diverse. For example, should a mishap occur in highly vegetated areas during a hot, dry summer, such a mishap would have a higher risk of extensive fires than would a mishap in more barren and rocky areas during the winter. When an aircraft crashes, it may release hydrocarbons. Those petroleums, oils, and lubricants not consumed in a fire could contaminate soil and water. The potential for contamination is dependent on several factors. The porosity of the surface soils will determine how rapidly contaminants are absorbed. The specific geologic structure in the region will determine the extent and direction of the contamination plume. The locations and characteristics of surface and groundwater in the area will also affect the extent of contamination to those resources.

Since entering the USAF inventory, C-130-type aircraft have flown approximately 16,799,000 hours. During this period, these aircraft have experienced 151 Class A mishaps, which equates to a Class A mishap rate of 0.90 per 100,000 flying hours, or the probability of a mishap occurring every 111,111 flying hours (Air Force Safety Center 2006a). Under current conditions, Little Rock AFB-based C-130-type aircraft fly approximately 21,650 hours annually. This results in a statistical prediction of a Class A mishap occurring once every 5.1 years. To place this into context, based on the number of annual sorties flown (21,651), this means that the probability of a Class A mishap occurring during any given sortie is 0.000009, or one chance in 110,420. In actuality, a Class A mishap involving a Little Rock AFB-based aircraft has not occurred since 1985 (personal communication, Ramirez 2005).

Wildlife Strike Hazard. Bird-aircraft strikes constitute a safety concern because they can result in damage to aircraft or injury to aircrews or local human populations if an aircraft crashes. Aircraft may encounter birds at altitudes up to 30,000 feet MSL or higher. However, most birds fly close to the ground. More than 97 percent of reported bird strikes occur below 3,000 feet AGL. Approximately 48 percent of bird strikes happen in the airport environment, and almost 15 percent occur during low-altitude flight training (Air Force Safety Center 2006b).

Migratory waterfowl (e.g., ducks, geese, and swans) are the most hazardous birds to low-flying aircraft because of their size and their propensity for migrating in large flocks at a variety of elevations and times of day. Waterfowl vary considerably in size, from 1 to 2 pounds for ducks, 5 to 8 pounds for geese, and up to 20 pounds for most swans. There are two normal migratory seasons, fall and spring. Waterfowl are usually only a hazard during migratory seasons. These birds typically migrate at night and generally fly between 1,500 to 3,000 feet AGL during the fall migration and from 1,000 to 3,000 feet AGL during the spring migration.

In addition to waterfowl, raptors, shorebirds, gulls, herons, songbirds, and other birds also pose a hazard. In considering severity, the results of bird-aircraft strikes in restricted areas show that strikes involving raptors result in the majority of Class A and Class B mishaps related to bird-

aircraft strikes. Raptors of greatest concern in the ROI are vultures and red-tailed hawks. Peak migration periods for raptors, especially eagles, are from October to mid-December and from mid-January to the beginning of March. In general, flights above 1,500 feet AGL would be above most migrating and wintering raptors.

Songbirds are small birds, usually less than one pound. During nocturnal migration periods, they navigate along major rivers, typically between 500 to 3,000 feet AGL. The potential for bird-aircraft strikes is greatest in areas used as migration corridors (flyways) or where birds congregate for foraging or resting (e.g., open water bodies, rivers, and wetlands).

While any bird-aircraft strike has the potential to be serious, many result in little or no damage to the aircraft, and only a minute portion result in a Class A mishap. During the years 1985 to 2005, the USAF Bird-Aircraft Strike Hazard (BASH) Team documented 66,642 bird strikes worldwide. Of these, 27 resulted in Class A mishaps where the aircraft was destroyed. These occurrences constituted approximately 0.04 percent of all reported bird-aircraft strikes (Air Force Safety Center 2006b).

Little Rock AFB is located along the Mississippi flyway. Large flocks of migratory birds travel these flyways during spring and fall migratory periods. Concentrations of birds in the eastern third of Arkansas are greatest in the fall. Raptors constitute a year-round threat. Small birds, such as starlings, which form dense flocks, create one of the most substantial threats at Little Rock AFB. The base uses Bird Cannons as a deterrent (fright-dispersal), and vegetation is kept mowed to levels that discourage roosting and nesting. The 314 AW has established an aggressive Bird Hazard Working Group to identify hazards and to initiate and monitor corrective actions to reduce these hazards (Little Rock AFB 2005c).

Data maintained by safety staff at Little Rock AFB indicate that over the last 10 years an average of approximately 41 bird-strikes have occurred annually. Almost half (48.1 percent) occurred in April, May, and September (personal communication, Ramirez 2005).

In addition to birds, Little Rock AFB has other concerns pertaining to wildlife intrusions to the airfield. Deer and other non-avian wildlife are present and create safety concerns. While some steps have been taken to minimize intrusion (e.g., the installation of an electrified fence) and are proving effective, the continued presence of attractant habitat (i.e., trees and wetlands) encourages their presence.

Aggressive habitat management, active and passive dispersal techniques, and effective warning techniques serve to reduce the wildlife strike hazard at Little Rock AFB (Little Rock AFB 2005c).

3.10.2.4 Anti-Terrorism/Force Protection

As a result of terrorist activities, the DoD and the USAF have developed a series of AT/FP guidelines for military installations. These guidelines address a range of considerations that include access to the installation, access to facilities on the installation, facility siting, exterior design, interior infrastructure design, and landscaping (DoD 2003; USAF n.d.). The intent of this siting and design guidance is to improve security, minimize fatalities, and limit damage to facilities in the event of a terrorist attack.

Many military installations, such as the 314 AW facilities, were developed before such considerations became a critical concern. Thus, under current conditions, many units are not able to comply with all present AT/FP standards. However, as new construction occurs, it would incorporate these standards, and as facilities are modified, AT/FP standards would be incorporated to the maximum extent practicable.

3.11 INFRASTRUCTURE

3.11.1 DEFINITION OF THE RESOURCE

Resources discussed in this section include transportation facilities on Little Rock AFB and the local utility services. The ROI for these resources encompasses Little Rock AFB and areas in the immediate vicinity of the installation.

3.11.2 EXISTING CONDITIONS

3.11.2.1 Transportation

Transportation Introduction

One way to classify roadway conditions is by using a qualitative measure called level of service (LOS). According to Geometric Design of Highways and Streets (American Association of State Highway and Transportation Officials 2001), "The level of service characterizes the operating conditions on the facility in terms of traffic performance measures related to speed and travel time, freedom to maneuver, traffic interruptions, and comfort and convenience. The levels of service range from level-of-service A (least congested) to level-of-service F (most congested)." Table 3.11-1 represents the general operating conditions for each LOS.

Table 3.11-1. Level of Service Operating Conditions

Level of Service	***General operating conditions***
A	Free flow
B	Reasonably free flow
C	Stable flow
D	Approaching unstable flow
E	Unstable flow
F	Forced or breakdown flow

Generally, most roadway facilities are designed to a LOS C or D to provide for the most economical solution for design. These roadways consist of the internal and external networks that provide access to the base and the buildings on base.

According to the Traffic Engineering and Highway Safety Bulletin (Military Traffic Management Command), 400 to 600 vehicles per lane per hour can be processed at a gate during medium security. These numbers can be increased by implementing tandem processing (two booths per lane). Capacity to the base can also be increased by setting staggered work hours, encouraging carpooling, adding lanes, redirecting traffic to other gates, or even building new gates. Other important aspects of gates include proximity to intersections (minimum of 300 feet from any intersection); proper transition tapers; adequate lighting; and ample traffic control via traffic control devices and signage.

Roadways on Little Rock AFB

The Little Rock AFB is considered a small urban area since its population is between 5,000 and 50,000. The roads and streets that allow mobility in and around Little Rock AFB can be functionally classified into four basic systems: Urban principal arterial system, urban minor arterial street system, urban collector street system, and the urban local street system (American Association of State Highway and Transportation Officials 2001). Roadways on Little Rock AFB are classified in the following manner (Little Rock AFB 1996):

- Major collectors (6): Arkansas Boulevard, Arnold Drive, Sixth Street, Texas Boulevard, Thomas Avenue, and Vandenberg Boulevard
- Minor collectors (3): Cannon Drive, First Street, and Second Street
- Residential or Local Streets (2): Airmen Housing Drive and Ballfield Drive (there are numerous other small residential roads not considered in the report)

Other roadways of interest outside Little Rock AFB include: I-67/167 (principal arterial); Arkansas Route 107 and Harris Road (minor arterials); and Marshall Road and McArthur Drive (major collectors). Table 3.11-2 is a list of roadways and some key characteristics of each that help describe the current conditions; Figure 3.11-1 shows some of the major roadways on Little Rock AFB.

Access Control Points

Little Rock AFB is accessed through the public road system by three routes: Vandenberg Boulevard (Main Gate), Harris Road (School Gate), and Arkansas Route 107 (Back Gate). These roadways control the access onto Little Rock AFB. The observed Average Daily Traffic near the gates in 1996 were as follows: Main Gate 24,000 vehicles; School Gate 8,500 vehicles; and Back Gate 6,600 vehicles. From the traffic engineering study, they observed the following inbound traffic flows during the morning peak hour:

- Main Gate – 1,129 vehicles
- Back Gate – 481 vehicles
- School Gate – 140 vehicles

Based on these volumes, the gates can process the volumes adequately under Low security conditions.

3.11.2.2 Utilities

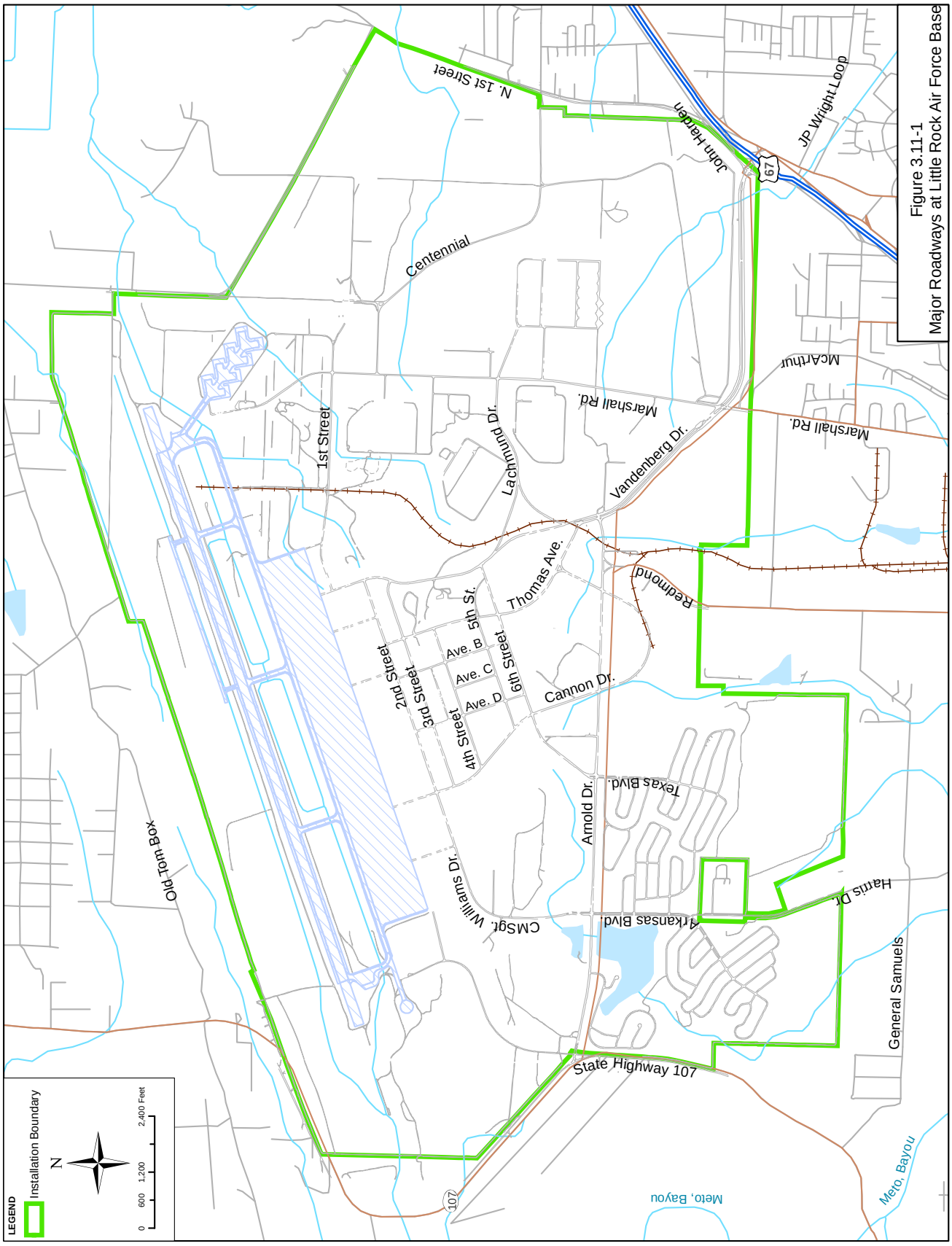
Water Supply

Little Rock AFB is supplied with potable water by the City of Jacksonville, which obtains its water from the North Little Rock municipal system. Water is drawn primarily from Lake Maumelle, treated by the Little Rock Municipal Water Works, distributed by the North Little Rock municipal system, and piped to Jacksonville and Little Rock AFB. The City of Jacksonville's potable water system design capacity is 10 million gallons per day (mgd) with an average daily output of 4 mgd. Peak demand occurs during the summer with a daily average of about 6 mgd (personal communication, Anderson 2004). Additional information on the Jacksonville water supply can be found in Appendix B.

Table 3.11-2. Little Rock AFB Roadways and Their Characteristics

Roadway Name	***On or Off Base***	***Functional Class***	***Number of Lanes***	***Speed limit (MPH)***
U.S. Route 67/167	Off	Principal arterial	Four lane divided	55
Arkansas Route 107	Off	Minor arterial	Two lane	45 to 55
Harris Road	Off	Minor arterial	Two lane	
Arkansas Boulevard	On	Major collector	Two lane divided	15 to 25
Arnold Drive	On	Major collector	Two lane	15 to 25
Marshall Road	Off	Major collector	Four lane	40
McArthur Drive	Off	Major collector	Two lane	
Sixth Street	On	Major collector	Two lane	25
Texas Boulevard	On	Major collector	Two lane	15
Thomas Avenue	On	Major collector	Two lane	
Vandenberg Boulevard	On	Major collector	Four lane divided	25 to 50
Cannon Drive	On	Minor collector	Two lane	
First Street	On	Minor collector	Two lane	
Second Street	On	Minor collector	Two lane	
Airmen Housing Drive	On	Local residential	One lane one-way	
Ballfield Drive	On	Local residential	One lane one-way	

MPH = miles per hour


Figure 3.11-1
Major Roadways at Little Rock Air Force Base
N. 1st Street
John Harden
JP Wright Loop
67
Centennial
McArthur
Marshall Rd.
1st Street
Lachmund Dr.
Vandenberg Dr.
Redmond
Thomas Ave.
5th St.
Ave. B
Ave. C
Ave. D
2nd Street
3rd Street
4th Street
6th Street
Cannon Dr.
Texas Blvd.
Arnold Dr.
Harris Dr.
Arkansas Blvd.
CMSgt. Williams Dr.
Old Hot Box
General Samuels
State Highway 107
107
Meto, Bayou
LEGEND
Installation Boundary
N
0
600
1,200
2,400 Feet

Water is stored in one 1.3 million gallon and two 30,000-gallon elevated tanks and supplied to base users by gravity flow. The base performs supplemental chlorination of water prior to distribution. Areas of reduced flow along the flightline experience heavy tuberculinity, or iron deposits, which produce a reddish discoloration in the water. Twenty-three automatic pipe-flushing devices have been installed. These devices automatically flush the system in areas of reduced flow and dead-end conditions to alleviate turbidity and low chlorine content caused by low usage. Base Civil Engineering maintains the water distribution system and 314 Medical Squadron periodically tests for chlorine, pH, pathogens, and contaminants such as lead, copper, and pesticides. The highest maximum daily potable water demand on file between 2000 and 2005 was 1.8 mgd, recorded on August 23, 2003 and included irrigation water for the golf course (personal communication, Whitt 2005). Additional information on the potable water distribution system, historic demand, and requirements can be found in Appendix B.

Sanitary Sewer System

Little Rock AFB's wastewater is conveyed to and treated by the Jacksonville Waste Water Utility's Johnson Regional Treatment Facility, which has a permitted average daily flow limit of 12.1 mgd (Jacksonville Wastewater Utility 2005; ADEQ [NPDES Permit AR0041335]).

The Base sanitary sewer collection system consists of two major lift stations and several smaller lift stations throughout the base; over 200,000 linear feet of sewer line mains in the MFH area; over 100,000 linear feet of main sewer lines in the main Base area, and two miles of 24-inch sewer main located off Base that connects to the Jacksonville Waste Water Utility's Johnson Regional Treatment Facility (personal communication, Whitt 2005). The Base sewer collection systems were constructed in 1955-1956 and have been slip lined and extensively repaired over the past several years. The majority of the system is concrete pipe, with some small sections of polyvinyl chloride, ductile iron, cast iron, vitrified clay, and transite. According to a recent Base study (Little Rock AFB 2004b), approximately half of the average sewage flow is comprised of groundwater infiltration and inflow and the issue is the focus of future improvements associated with the sewer system (personal communication, Windsor 2006). Additional information on the sanitary sewer system can be found in Appendix B.

Electrical Service

Entergy is the present conveyor of electricity to Little Rock AFB (personal communication, Whitt 2005). The utility-owned sub-station is located directly across Marshall Road from the Base switch station, which is located just outside the main gate. The Base currently distributes primary power by four 13.8 kilovolt feeders, two for the industrial portion of the Base and two for the MFH portion. Circuits A and B provide service to the main cantonment area, flightline,

and airfield, while C and D serve the family housing area. The system consists of approximately 328 miles of primary and secondary distribution lines with 80 percent overhead and 20 percent underground (USAF 2001). Additional information on the electrical system can be found in Appendix B.

Natural Gas Distribution System

Little Rock AFB receives its natural gas supply from Centerpoint Energy ARKLA via a distribution network operated by Seminole. An 8-inch steel main connects the base to the contractor's district regulator located just west of Redmond Avenue at the southern boundary. The cantonment area of the base is served by a looped system. Several non-looped lines provide service to individual facilities or areas, such as the Defense Reutilization and Marketing Office (DRMO) and recycling area, the AMC Combat Aerial Delivery School (CADS) facilities at the east end of the flightline, the fuel farm, and the munitions storage area. The gas service system, which is predominately steel pipe, is protected by a cathodic protection system, to prevent corrosion. Recent service lines have been installed using polyethylene pipe. While more likely to be damaged by digging, this piping is not susceptible to corrosion and does not require cathodic protection. Additional information on the natural gas distribution system can be found in Appendix B.

Storm Drainage System

The storm drainage system is made up of about 32 miles of underground piping, drop inlets, and manholes. In addition to the underground drainage network, portions of the base are drained by overland surface flow to man-made and natural drainage courses that carry the storm water to one of the discharge points. Additional details on the storm drainage system can be found in Chapter 3 of the Spill Prevention Control and Countermeasures Plan (AETC 2002).

3.12 SOLID AND HAZARDOUS MATERIALS AND WASTE

3.12.1 DEFINITION OF THE RESOURCE

This section describes the affected environment associated with hazardous materials and petroleum products, hazardous and petroleum wastes, Installation Restoration Program (IRP) sites, and solid waste at the construction and demolition areas.

The terms "hazardous materials" and "hazardous waste" refer to substances defined as hazardous by the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and the Solid Waste Disposal Act (SWDA), as amended by the Resource Conservation and Recovery Act (RCRA). In general, hazardous materials include substances that, because of their

quantity, concentration, or physical, chemical, or infectious characteristics, may present substantial danger to public health or the environment when released into the environment. Hazardous wastes regulated under RCRA are defined as any solid, liquid, contained gaseous, or semisolid waste, or any combination of wastes that either exhibit one or more of the hazardous characteristics of ignitability, corrosivity, toxicity, or reactivity, or are listed as a hazardous waste under 40 CFR Part 261. Petroleum products include petroleum-based fuels, oils, and their wastes. The IRP is a USAF program to identify, characterize, and remediate environmental contamination from past activities at Air Force installations.

Issues associated with hazardous material and waste typically center around use of chemicals, waste streams, underground storage tanks (USTs), aboveground storage tanks (ASTs), and the storage, transport, use, and disposal of pesticides, fuels, lubricants, and other industrial substances. When such materials are improperly used in any way, they can threaten the health and well being of wildlife species, habitats, and soil and water systems, as well as humans. This section also considers solid waste.

The management of hazardous materials and hazardous waste is governed by specific environmental statutes. The key regulatory requirements include:

Comprehensive Environmental Response, Compensation and Liability Act of 1980 (42 USC 9601–9675) as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986. CERCLA/SARA regulates the prevention, control, and compensation of environmental pollution.

Community Environmental Response Facilitation Act of 1992 (CERFA) (42 USC 9620). This act amended CERCLA to require that, prior to termination of federal activities on any real property owned by the federal government, agencies must identify real property where hazardous substances were stored, released, or disposed of.

Emergency Planning and Community Right-to-Know Act (EPCRA) of 1986 (42 USC 11001–11050). EPCRA requires emergency planning for areas where hazardous materials are manufactured, handled, or stored and provides citizens and local governments with information regarding potential hazards to their community.

Resource Conservation and Recovery Act or 1976 (42 USC 6901–6992). RCRA established standards and procedures for handling, storage, treatment, and disposal of hazardous waste.

Federal Facility Compliance Act (FFCA) of 1992 (Public Law [P.L.] 102-426). This act provides for a waiver of sovereign immunity on the part of federal agencies with respect to

federal, state, and local requirements relating to RCRA solid and hazardous waste laws and regulations.

Pollution Prevention Act of 1990 (42 USC 13101–13109). This act encourages minimization of pollutants and waste through changes in production processes.

USEPA Regulation on Identification and Listing of Hazardous Waste (40 CFR Part 261). This regulation identifies solid wastes subject to regulation as hazardous and to notification requirements under RCRA.

USEPA Regulation on Standards for the Management of Used Oil (40 CFR Part 279). This regulation delineates requirements for storage, processing, transport, and disposal of oil that has been contaminated by physical or chemical impurities during use.

USEPA Regulation on Designation, Reportable Quantities, and Notification (40 CFR Part 302). This regulation identifies reportable quantities of substances listed in CERCLA and sets forth notification requirements for releases of those substances. It also identifies reportable quantities for hazardous substances designated in the CWA.

The ROI for hazardous materials, hazardous waste, and petroleum products encompasses areas that could be exposed to an accidental release of hazardous substances from the proposed construction, renovation, or demolition activities. Therefore, the ROI for this section is defined as the boundary of Little Rock AFB.

3.12.2 EXISTING CONDITIONS

This section describes the management of hazardous materials and petroleum products, hazardous and petroleum wastes, IRP sites, and solid wastes within the ROI.

3.12.2.1 Hazardous Materials and Petroleum Products

A hazardous materials pharmacy (HAZMART) tracking system has been implemented at Little Rock AFB to manage documentation and handling of hazardous materials. This is a single source, pharmaceutical approach to inventory, monitor, and reduce the quantities of stored materials (Little Rock AFB 2001a).

The installation receives JP-8 fuel primarily by pipeline, with an alternate delivery method by commercial tank truck. Fuel is stored in bulk storage tanks located in the fuel farm. Pipelines transfer the fuel to hydrant systems or into refueler trucks for aircraft refueling. There are 14 50,000-gallon tanks at two pumphouses. Pumphouse one has one 550-gallon UST. These tanks

meet all regulated tank requirements. They are epoxy coated, and have leak detection, spill and overfill protection, and cathodic protection (Little Rock AFB 2001a).

There are a total of 9 regulated USTs on Little Rock AFB. Interstitial alarms are used on aerospace ground equipment tanks and the motor pool tanks to notify personnel when there may be a leak. All of the jet fuel tanks have a computerized system that provides constant tank monitoring information. Tanks that do not have automatic tank gauging equipment are monitored at least monthly, some daily, by physical inspection (Little Rock AFB 2001a).

There are 13 regulated ASTs located on base. Three of the regulated self contained tanks are located at AAFES, one at the ANG, two at bulk fuel storage (25,000-gallon), one at aerospace ground equipment, and six at the used oil storage area. Non-regulated AST's consist of five field erected steel tanks, three holding incoming JP-8, and two 25,000-gallon tanks storing propylene glycol.

Little Rock AFB engaged in a variety of activities in the past that may have resulted in the release of hazardous materials near the proposed construction, renovation, and demolition areas. These releases were managed in accordance with the *Spill Prevention, Control, and Countermeasures Plan* (Little Rock AFB 2002a).

3.12.2.2 Hazardous and Petroleum Wastes

Hazardous waste management at Little Rock AFB adheres to RCRA regulations and is guided by the March 2001 *Hazardous Waste Management Plan*. Little Rock AFB is a large quantity generator of hazardous waste and, therefore, these wastes are managed in accordance with large quantity generator regulations (Little Rock AFB 2001b).

Mission-specific requirements result in the generation of several types of hazardous and petroleum wastes which require special handling for proper disposal. These include waste paint, paint stripper, paint-contaminated rags, and degreasers. The installation does not have a permit to treat, store, or dispose of hazardous waste and must remove wastes from the base within 90 days. Hazardous wastes are controlled by generating activities at numerous Initial Accumulation Points. The waste containers are then collected and taken to a Central Accumulation Point, which is an accumulation site, and then transported to the DRMO on base. Wastes may also be taken directly to the DRMO. The DRMO ships all hazardous waste to an approved treatment, storage, or disposal facility (Little Rock AFB 2001a).

Hazardous waste management and the base-recycling program are combining efforts to reduce pollution. The current efforts include the recovery of antifreeze, used oils and hydraulic fluids, containerizing chromium chips, recycling glass beads and paint chips from the paint stripping

process, and the recovery of cadmium used in plating and anticorrosive treatment (Little Rock AFB 2001a).

3.12.2.3 Installation Restoration Program Sites

The IRP established a process to evaluate past disposal sites, control the migration of contaminants, assess potential hazards to human health and the environment, and conduct environmental restoration activities. The IRP is conducted in accordance with Section 211 of SARA and the Defense Environmental Restoration Program. The USAF coordinates IRP activities with the USEPA and the State of Arkansas.

According to the IRP Management Action Plan, Little Rock AFB has the responsibility for a total of 55 IRP sites and Areas of Concern (AOCs). The location of the IRP sites are shown in Figure 3.12-1. Little Rock AFB is actively pursuing cleanup at all sites, consistent with federal and state regulations and guidance (Little Rock AFB 2006)

The IRP includes remedial investigation/feasibility studies to determine the disposition of hazardous waste sites identified at the base. The program is administered through the 314th CES/CEV, and is supported by the Public Affairs Office and the Staff Judge Advocate Office. In April 2000, Little Rock AFB signed a Consent Order with ADEQ to direct future remediation actions in accordance with RCRA provisions.

3.12.2.4 Solid Waste

Municipal solid waste management and compliance at USAF installations is established in AFI 32-7042, *Solid and Hazardous Waste Compliance*. In general, AFI 32-7042 establishes the requirements for installations to have a solid waste management program to incorporate the following: a solid waste management plan; procedures for handling, storage, collection, and disposal of solid waste; record-keeping and reporting; and pollution prevention. Source reduction, resource recovery, and recycling of solid waste are addressed in AFI 32-7080, *Pollution Prevention Program*.

Recycling has been a part of life at Little Rock AFB since 1993. Receptacles are placed throughout the base for recyclables such as paper, aluminum, plastics, newspapers, glass, cardboard, wood, and metal. A private contractor collects the materials, about 120 tons per month, and takes them to a recycling center. This program has a positive cost/benefit ratio for the base. Recyclable materials may also be taken to the on-base recycling center for disposal (Little Rock AFB 2001a).

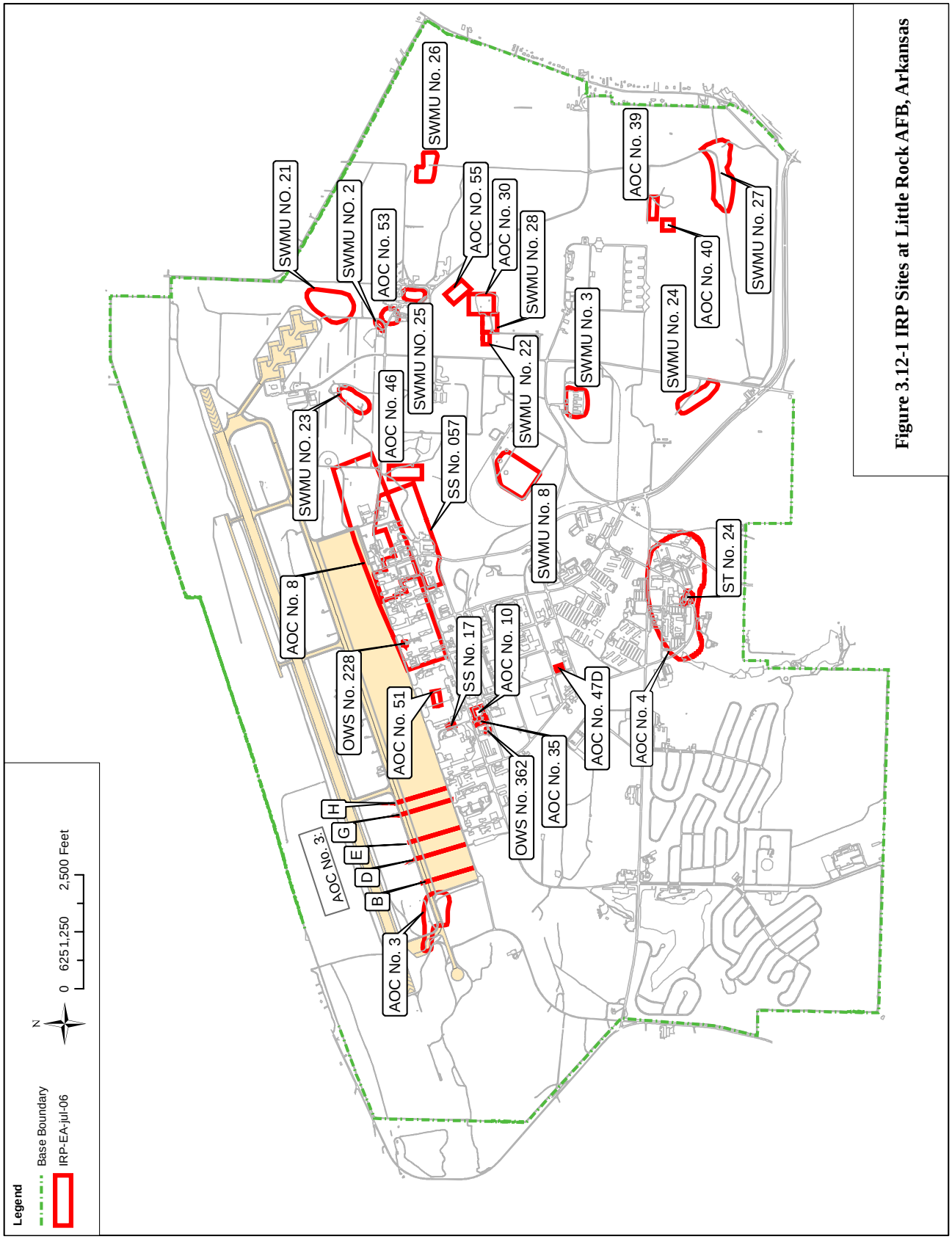


Figure 3.12-1 IRP Sites at Little Rock AFB, Arkansas

Trash and other household refuse, totaling around 4,000 tons per year, is collected by a contractor and removed to an off-base local landfill. Collection is made on a daily basis for any facility involved with food preparation. The family housing and main cantonment refuse is collected on a weekly basis. Items such as tires and batteries may be dropped off at the on-base recycling center for disposal (Little Rock AFB 2001a).

Yard waste is placed in designated dumpsters on base or in containers in the housing area. A private contractor picks up the waste for removal to an off-base composting facility (Little Rock AFB 2001a).

Municipal solid waste from Little Rock AFB is transported and disposed of at Two Pines Landfill, located in the city of Jacksonville. This is a Subtitle D Landfill permitted to accept municipal waste. The currently permitted and operating disposal cells have an expected operating period of approximately 4 years before reaching capacity.

Buildings constructed prior to 1980 may contain asbestos and those constructed prior to 1978 may contain lead-based paint. Renovation and demolition at these buildings are managed in accordance with the *Asbestos Management Plan* (Little Rock AFB 2001b) and *Lead Management & Exposure Control Plan* (Little Rock AFB 2002b).

4.0 ENVIRONMENTAL CONSEQUENCES

This chapter of the EA assesses potential environmental consequences associated with the Proposed Action and its alternatives. Potential impacts are addressed in the context of the scope of the Proposed Action and the alternatives as described in Chapter 2.0 and in consideration of the potentially affected environment as characterized in Chapter 3.0.

4.1 EARTH RESOURCES

4.1.1 METHODOLOGY

Protection of unique geologic features, minimization of soil erosion, and siting facilities in relation to potential geologic hazards and soil limitations are considered when evaluating impacts to earth resources. Generally, impacts can be avoided or minimized if proper construction techniques, erosion control measures, and structural engineering designs are incorporated into project development.

Analysis of potential impacts to geologic resources typically includes identification and description of resources that could potentially be affected, examination of the potential effects that an action may have on the resource, and provision of mitigation measures, if necessary. Analysis of impacts to soil resources resulting from proposed activities examines the suitability of locations for proposed operations and activities. Impacts to soil resources can result from earth disturbance that would expose soil to wind or water erosion.

4.1.2 IMPACTS

4.1.2.1 Proposed Action

Under the Proposed Action, the physiography, underlying geology, and topography of the area would not change; however, the soil would be disturbed by construction activities. Under this alternative, approximately 16.4 acres of land would be disturbed with 13.4 acres rendered impervious as a result of new building footprints, associated pavements, and demolition activities.

All proposed construction would predominantly occur on Urban Land, with a few projects being located on Linker Series soils and one on Tiak Series soils (Figure 4.1-1). The Linker Series soils are well-drained, gently sloping to moderately steep soils on the top and sides of mountains, on benches and on low ridges in valleys. The depth to bedrock is about 30 inches. The shallow depth to bedrock of this series presents a moderate construction constraint. The Tiak soils are moderately well drained, nearly level to gently sloping soils. Permeability is slow and available water capacity is high. Bearing capacity is generally low, and the Tiak soils have a high shrink-swell potential (USDA 1975).

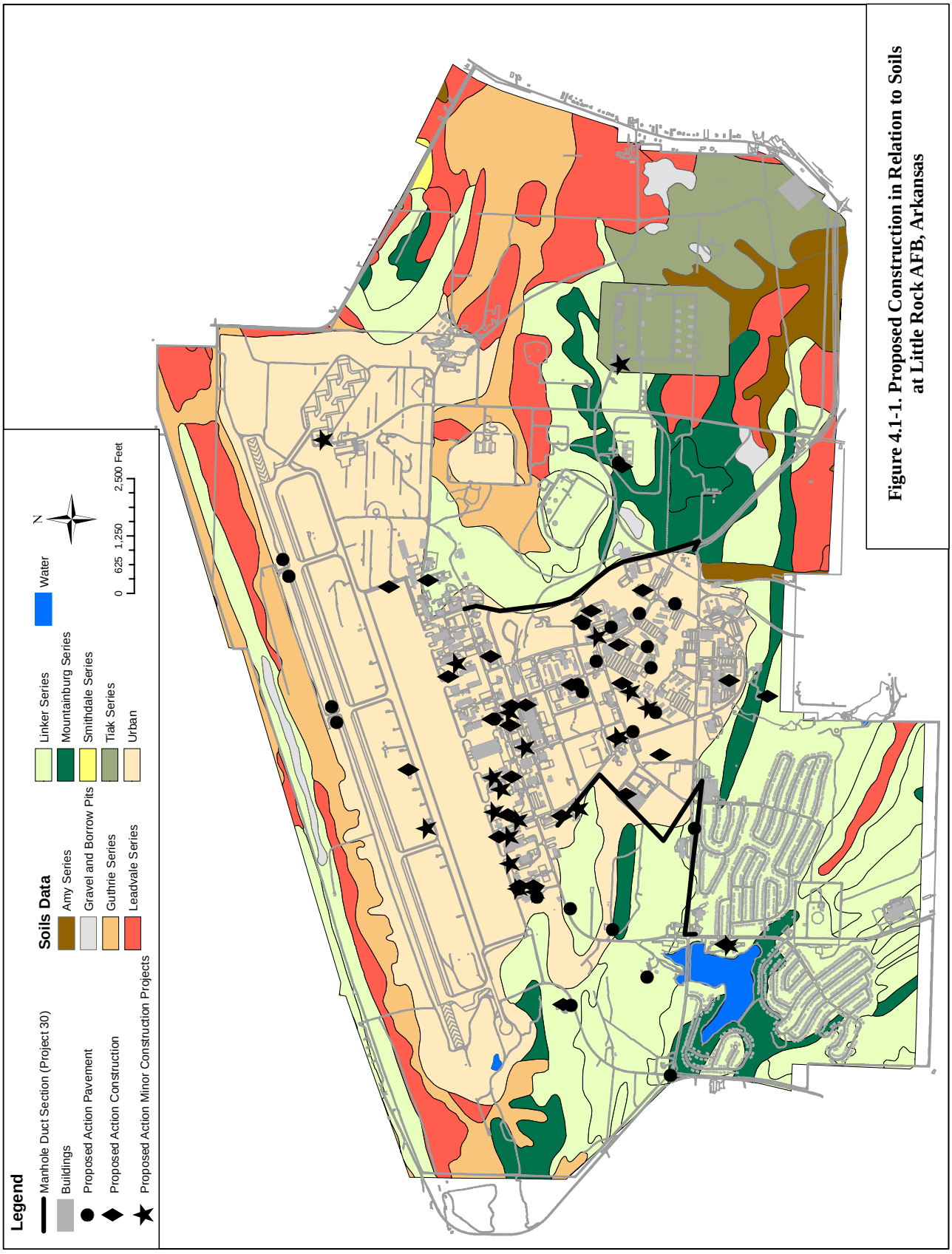


Figure 4.1-1. Proposed Construction in Relation to Soils at Little Rock AFB, Arkansas

Urban Land soils have been substantially disturbed by past activities and can no longer be classified as the original soil or any other native soil. Further disturbance of Urban Land soils would have no impact in terms of preserving unique soils. The Proposed Action would not impact Prime Farmland or Farmland of Statewide Importance since the base is already urbanized (Natural Resources Conservation Service 2006).

Under the Proposed Action, it is estimated that a total of approximately 16.4 acres would be disturbed as a result of construction and pavements activities. Well maintained silt fences, wetting of the construction site, daily site inspections, and other BMPs would be used to limit or eliminate soil movement, stabilize runoff, and control sedimentation. Following construction, disturbed areas not covered with impervious surfaces would be reestablished with appropriate vegetation and managed for future erosion. Given the relatively small area disturbed at any given time, and the employment of engineering practices that would minimize potential erosion, impacts to earth resources as a result of the Proposed Action are expected to be minimal.

4.1.2.2 Alternative Action

Under the Alternative Action, the physiography, underlying geology, and topography of the area would not change. Project design would ensure that appropriate foundation techniques are employed so that the high shrink-swell potential of the Midway Formation had no adverse affects on the building structure.

Under this alternative it is estimated that a total of approximately 430 acres would be disturbed as a result of construction and pavements activities. While this area in considerably larger than under the Proposed Action, it is clear that all this construction activity would not occur during the same time. Construction would occur as the need arises and as funds became available. It is unlikely that more than 10 percent (43 acres) of this construction activity would occur at any one time. Well maintained silt fences, wetting of the construction site, daily site inspections, and other BMPs would be used to limit or eliminate soil movement, stabilize runoff, and control sedimentation. Following construction, disturbed areas not covered with impervious surfaces would be reestablished with appropriate vegetation and managed for future erosion. Given the relatively small area potentially disturbed at any given time, and the employment of engineering practices that would minimize potential erosion, impacts to earth resources are expected to be minor.

Under this alternative, impacts to soils would be similar to those described under the Proposed Action.

4.1.2.3 No Action Alternative

Under the No Action Alternative, the 314 AW would maintain their existing facilities, and would not build new facilities. Similarly, there would be no facility demolitions. No impacts to earth resources would occur as a result of the No Action Alternative. Conditions would remain as described in Section 3.1.2.

4.1.2.4 Cumulative Impacts

There are several other ground-disturbing activities either currently underway, or planned over the short-term in the ROI (Section 2.7). Several hundred acres of soil could be disturbed in the Jacksonville area as a result of the projects described in Section 2.7 over the next several years. Appropriate BMPs as described above would be employed to minimize potential erosion during construction activities and appropriate vegetation would be re-established on the sites to ensure rapid soil stabilization. Cumulative impacts to earth resources are expected to be minor.

4.2 WATER RESOURCES

4.2.1 METHODOLOGY

Criteria for evaluating impacts related to water resources associated with the proposal are water availability, water quality, and adherence to applicable regulations. Impacts are measured by the potential to reduce water availability to existing users; endanger public health or safety by creating or worsening health hazards or safety conditions; or violate laws or regulations adopted to protect or manage water resources.

The NPDES Branch of the Water Division of ADEQ and the USACE are the regulatory agencies that govern water resources in the state of Arkansas and at Little Rock AFB. These agencies have adopted the USEPA's applicable environmental rules and regulations. The CWA of 1977 regulates pollutant discharges and development activities that could affect aquatic life forms or human health and safety.

4.2.2 IMPACTS

4.2.2.1 Proposed Action

Under the Proposed Action, approximately 16.4 acres of land would be disturbed resulting in approximately 13.4 acres of new impervious surfaces. Construction activities would not occur within the 100-year floodplain (Figure 4.2-1). However, the Proposed Action would add to the impervious surfaces associated with Little Rock AFB.

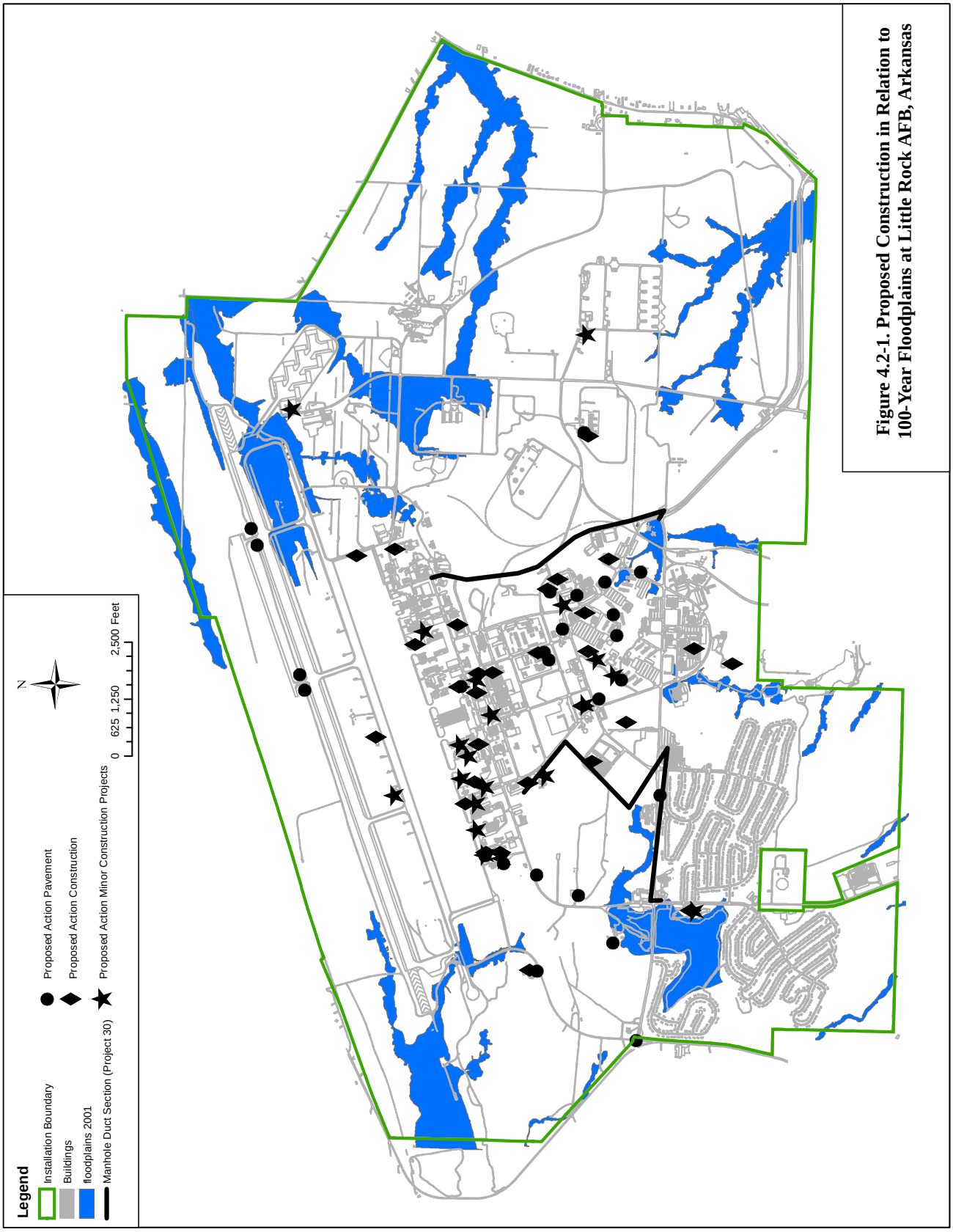


Figure 4.2-1. Proposed Construction in Relation to 100-Year Floodplains at Little Rock AFB, Arkansas

In general, increases in impervious surfaces act to increase peak discharge volume and speed delivery of water to nearby streams and waterways, which ultimately increases chances for flooding. In undeveloped land, rainfall and snowmelt collect and are stored in vegetation, in the soil column, or in topographic depressions. Water is then utilized by plants and is respired, or it moves slowly into groundwater and/or eventually to water bodies where it slowly moves through the hydrologic cycle. Removal of vegetation decreases infiltration into the soil column and thereby increases the quantity and timing of runoff. Replacement of vegetation with an impervious surface eliminates any potential for infiltration and also speeds up delivery of the water to nearby drainage and stream channels. With less storage capacity in the soil column and vegetation, urban streams rise more quickly during storm events and have higher peak discharge rates, which increase the potential for flooding.

An addition of approximately 13.4 acres of impervious surface to this area would act to increase peak discharge volume and speed delivery of water to Jack's Bayou and Rocky Branch, and ultimately to Bayou Meto. The estimated increase in runoff volume using the Rational Method for a 24-hour period based on a 25-year 24-hour storm (USAF 1983) with a rainfall intensity of 7.5 inches per hour (National Oceanic and Atmospheric Administration 1960-1976) is approximately 2.9 acre-feet, assuming a change in rainwater retention from 40 percent for mowed grass to 5 percent for pavements. However, procedures would be implemented to moderate the volume and slow the discharge to these streams. Landscaping would be installed strategically in the proposed action project areas to increase infiltration capability. Parking lots would be sized to minimize the amount of impervious surface to the extent possible. Possible modifications or additions to the current volume of storm water retention structures would be evaluated as part of the final designs for the individual projects. A 3-foot deep retention pond approximately 1-acre in size would accommodate the additional flows and would easily fit into available open spaces in the vicinity of the affected outfalls.

A Phase I NPDES General Construction Permit and associated SWPPP with associated BMPs would be required for each project grouping, including structural and programmatic controls for eliminating pollution from construction related runoff. During the clearing, grading, and construction of facilities, erosion control BMPs would be employed to minimize erosion into the nearby waterways on the site. These measures would include installation of silt fences or a berm between these streams and the ongoing construction processes. Impacts to water resources as a result of the Proposed Action are expected to be minimal.

4.2.2.2 Alternative Action

Under the Alternative Action, there would be an increase of approximately 430 acres of new impervious surfaces. The current amount of impervious surfaces is estimated to be 1,079 acres

out of a total of 6,193 acres (Appendix B). This would result in an increase of 39 percent over the current impervious surfaces and represents approximately 7 percent of the total land at the base. Construction activities would not occur within the 100-year floodplain.

A Phase I NPDES General Construction Permit and associated SWPPP with associated BMPs would be required for each project grouping, including structural and programmatic controls for eliminating pollution from construction related runoff. During the clearing, grading, and construction of facilities, erosion control BMPs would be employed to minimize erosion into the nearby waterways on the site. These measures would include installation of silt fences or a berm between these streams and the ongoing construction processes. While the same measures required for the Proposed Action would also apply to this Alternative Action, the potential size of additional storm water retention facilities would approximate the size of the current Base Lake. A storm water feature approaching the size of Base Lake could be accommodated within open spaces within the base boundary. Alternatives to a new base lake would include cooperation with other agencies within the Bayou Meto Wetland Planning Area regarding an off base retention facility that facilitates improvements to regional flooding. Well maintained silt fences, wetting of the construction site, daily site inspections, and other BMPs would be used along with construction phasing efforts to limit or minimize sedimentation of nearby waterways. Impacts to water resources as a result of the Alternative Action would be expected to be minor.

4.2.2.3 No Action Alternative

Under the No Action Alternative, construction associated with the General Plan and BRAC related projects would not occur. There would be no impacts to the 100-year floodplain. No impacts to water resources would occur, and conditions would remain as described in Section 3.2.2.

4.2.2.4 Cumulative Impacts

There are several other ground-disturbing activities either currently underway, or planned over the short-term in the ROI (Section 2.7). Appropriate construction BMPs as described above would be employed to minimize potential runoff and sedimentation during construction activities and appropriate vegetation would be re-established on the sites to ensure rapid soil stabilization. The increase in impervious surfaces throughout the region would require that the storm water management systems are monitored and updated, as necessary to accommodate increased runoff. Permanent retention basins may be required depending on the increase in runoff. Cumulative impacts to water resources are expected to be minor given the implementation of BMPs.

4.3 BIOLOGICAL RESOURCES

4.3.1 METHODOLOGY

Evaluation of impacts is based upon (1) the importance (legal, commercial, recreational, ecological, or scientific) of the resource, (2) the rarity of a species or habitat regionally, (3) the sensitivity of the resource to proposed activities, and (4) the duration and magnitude of ecological ramifications. Impacts to biological resources are considered to be greater if priority species or habitats are adversely affected over relatively large areas and/or disturbances cause reductions in population size or distribution of a priority species.

4.3.2 IMPACTS

4.3.2.1 Proposed Action

Vegetation

Under the Proposed Action, virtually all proposed construction activities would occur within the main cantonment area on Little Rock AFB (Figures 2.4-1, 2.4-2, and 2.4-3). Although there are patches of native vegetation within the main cantonment area, these areas have been associated with previous disturbances since the base has been present. There are no special qualities associated with these patches, and removal of portions of this vegetation to accommodate construction activities or building footprints would have little to no impact on the overall vegetation community on the base.

The proposed increase in aircraft and assigned personnel should have no direct effect on the vegetation communities at Little Rock AFB.

Wildlife

As mentioned above, patches of existing vegetation would be removed (primarily within the main cantonment area) to accommodate proposed construction activities. Wildlife currently found on Little Rock AFB is typically well adapted to the highly fragmented environment of the cantonment area, and in most cases are thriving in this environment. Additional development of the main cantonment area is not expected to adversely affect wildlife known to occur on the base.

Virtually none of the proposed construction would be located in areas of the base that would be considered undeveloped. In fact, the new future land use that that has been developed during the process of this EIAP has actually set aside many of the more densely forested areas of the base as Open Space and Recreation areas (Appendix B). These areas will continue to be managed in

accordance to the guidelines found in the base Integrated Natural Resources Management Plan (USAF 2002).

The proposed increase in aircraft under the Proposed Action should have little to no impact on wildlife populations at the installation. These species are already well adapted to life on an active military installation, and any increase in noise associated with the Proposed Action would not be expected to result in any change to wildlife at the base.

The proposed increase in assigned personnel at Little Rock AFB under the Proposed Action should similarly have no direct effect to wildlife on the base. This is a relatively minor increase in human activity at the base, and would like not be noticeable to wildlife.

Threatened, Endangered and Other Sensitive Species

The implementation of the Proposed Action would be expected to have no impact on federal and state listed species because these species do not occur on Little Rock AFB, with the possible exception of the bald eagle and the interior least tern. The bald eagle has been sighted only on rare occasions and is not known to nest on the base. Therefore, no impact to the eagle would be expected. The interior least tern has just recently been sighted on the base (June 15, 2006). It is currently unknown whether this bird is nesting on the base, and observations will continue until a determination has been made (personal communication, Popham 2006). The base is currently coordinating with the USFWS to determine a course of action with respect to this individual, and no actions that have the potential to impact this bird would occur without concurrence from the USFWS.

The Proposed Action is similarly unlikely to impact other sensitive species that dwell in the forest and grasslands in the project area because construction is proposed primarily for the main cantonment area where these species are not found. The Diana fritillary butterfly has the potential to occur in the mesic woods in the floodplain along streams on base; however these areas would not be impacted under the Proposed Action. The remaining sensitive species found on the base are birds. The grasshopper sparrow could occur in the affected open grasslands but this species is not known to breed on the base at this time. Other sensitive grassland species that do breed on base and could be affected are the field sparrow and dickcissel. The potential for negative impacts on these species is slight, given the small amount and highly fragmented nature of the habitat that would be permanently affected and the current high level of human activity near most of the grassland habitat in the project area. The six forest dwelling bird species that are of concern due to population declines (see Table 3.3-1) could occur in the forest habitat, but forested habitat is not expected to be impacted under the Proposed Action.

Wetlands and Other Aquatic Habitat

Proposed construction and demolition activities would not impact wetlands or waters of the U.S. because no activities are proposed within 50 feet of streams and/or wetlands. Should proposed construction sites be modified such that they are within these habitats, further EIAP would occur prior to implementation. No impacts to wetlands or waters of the U.S. are anticipated as a result of the Proposed Action.

4.3.2.2 Alternative Action

Vegetation

Under the Alternative Action, the specific location of construction activities (i.e., site specific) is unknown. Each land use type has been identified to have a potential development capability, but specific projects and their locations have not been identified. Key areas in terms of vegetation on the base are primarily associated with the Open Space and Recreation land uses (see Figure 2.5-1). Given that the existing development in these areas is minimal and the proposed development is based on a ratio of the current development, little development would occur in these areas under the Alternative Action. The vast majority of construction activities would likely occur within the main cantonment area on Little Rock AFB. As with the Proposed Action above, although there are patches of native vegetation within the main cantonment area, these areas have been associated with previous disturbances since the base has been present. There are no special qualities associated with these patches, and removal of portions of this vegetation to accommodate construction activities or building footprints would have little to no impact on the overall vegetation community on the base.

The proposed increase in aircraft and assigned personnel should have no direct effect on the vegetation communities at Little Rock AFB under the Alternative Action.

Wildlife

As mentioned above, patches of existing vegetation would be removed (primarily within the main cantonment area) to accommodate construction activities under the Alternative Action. Because this alternative would accommodate approximately 3,000,000 SF of building footprint (as opposed to approximately 715,000 SF under the Proposed Action), more vegetation within the patchy cantonment area would be eliminated. However, as with the Proposed Action, wildlife currently found on Little Rock AFB is typically well adapted to the highly fragmented environment of the cantonment area, and in most cases are thriving in this environment. Additional development of the main cantonment area, as described under the Alternative Action, is not expected to adversely affect wildlife known to occur on the base.

The proposed increase in aircraft under the Alternative Action should have little to no impact on wildlife populations at the installation. These species are already well adapted to life on an active military installation, and any minor increase in noise associated with the action would not be expected to result in any change to wildlife at the base.

The proposed increase of 6,916 assigned personnel at Little Rock AFB under the Alternative Action should similarly have no direct effect to wildlife on the base. The increase in personnel would likely occur over several years, giving wildlife an opportunity to adjust to the increased activity. None of these species are uncommon and should they eventually move off the installation due to increased activity, no overall impact to the species would be observed.

Threatened, Endangered and Other Sensitive Species

The implementation of the Alternative Action would be expected to have no impact on federal and state listed species because these species do not occur on Little Rock AFB, with the possible exception of the bald eagle and the interior least tern. The bald eagle has been sighted only on rare occasions and is not known to nest on the base. Therefore, no impact to the eagle would be expected. The interior least tern has just recently been sighted on the base (June 15, 2006). It is currently unknown whether this bird is nesting on the base, and observations will continue until a determination has been made (personal communication, Popham 2006). The base is currently coordinating with the USFWS to determine a course of action with respect to this individual, and no actions that have the potential to impact this bird would occur without concurrence from the USFWS.

Given that the specific site locations for projects under the Alternative Action are currently unknown, this alternative would have the potential to affect other sensitive species that dwell in the forest and grasslands if care is not given to the siting of these species. The Diana fritillary butterfly has the potential to occur in the mesic woods in the floodplain along streams on base. The alligator snapping turtle could occur in streams that are deep enough for it. The remaining sensitive species that could occur in the on base are birds. The grasshopper sparrow could occur in the grassland areas, but this species is not known to breed on the base at this time. Other sensitive grassland species that do breed on base but could be affected are the field sparrow and dickcissel. The potential for negative impacts on these species is slight, given the small amount and highly fragmented nature of the habitat that could be permanently affected under this action and the current high level of human activity near most of the grassland habitat on base. The six forest dwelling bird species that are of concern due to population declines (see Table 3.3-1) could occur in forest habitat on base. This includes species such as the Kentucky warbler and Louisiana waterthrush, which occur in mesic forests on the base. These species would typically be found in less fragmented portions of the base such as some of the areas designated as Open

Space and Recreation (i.e., north of the runway); and these areas would see little development under this alternative. It is clear that sensitive species could be impacted under the Alternative Action should care not be given to the siting and design of facilities as they evolve. The Little Rock AFB Natural Resources Coordinator must be involved in the design and siting of all facilities that could occur in these habitats so that any potential impacts to sensitive species are minimized.

Wetlands and Other Aquatic Habitat

Although specific site locations for construction are not identified for the Alternative Action, construction and demolition activities would not impact wetlands or waters of the U.S. because no activities would be located within 50 feet of streams and/or wetlands. Should proposed construction sites be modified such that they are within these habitats, further EIAP would occur prior to implementation. No impacts to wetlands or waters of the U.S. are anticipated as a result of the Alternative Action.

4.3.2.3 No Action Alternative

Under the No Action Alternative, proposed construction and demolition would not occur. There would be no increase in assigned personnel at Little Rock AFB, and there would be no increase in assigned aircraft. Similarly, there would be no increase in night-time flying operations. Under the No Action Alternative, conditions for biological resources would remain as described in Section 3.2.2. There would be no impacts to biological resources as a result of the No Action Alternative.

4.3.2.4 Cumulative Impacts

There are several other activities either currently underway, or planned over the short-term in the ROI (Section 2.7). Construction projects on Little Rock AFB are primarily sited within the existing cantonment area, and because this area is previously disturbed and there are no threatened or endangered species known to occur (with the exception of the interior least tern) at these sites, impacts to biological resources are not expected as a result of the construction plans. Coordination will continue with USFWS regarding the interior least tern. Construction off base could impact is planned for areas that are already highly fragmented and previously disturbed. No large contiguous areas of forested habitat are expected to be impacted by the projects listed in Section 2.7. There are several wetlands, consisting of approximately 70 acres that may be filled or otherwise impacted as a result of the UFC compliance projects on Little Rock AFB. Cumulative impacts to biological resources as a result of these projects are expected to be minor.

4.4 AIR QUALITY

4.4.1 METHODOLOGY

Air emissions resulting from the Proposed Action were evaluated in accordance with federal, state, and local air pollution standards and regulations. The air quality impacts from a proposed activity or action would be significant if they:

- increase ambient air pollution concentrations above any NAAQS;
- contribute to an existing violation of any NAAQS;
- interfere with or delay timely attainment of NAAQS; or
- impair visibility within any federally mandated PSD Class I area.

The approach to the air quality analysis was to estimate the increase in emission levels due to the Proposed Action or any alternatives.

According to USEPA's General Conformity Rule in 40 CFR Part 51, Subpart W, any proposed federal action that has the potential to impact air quality, as described above, in a nonattainment or maintenance area must undergo a conformity analysis. Since Pulaski County is currently an attainment area for all criteria air pollutants, a conformity analysis is not required.

As described in Section 3.4.1, Section 169A of the CAA established the PSD regulations to protect the air quality in regions that already meet the NAAQS. Certain national parks, monuments, and wilderness areas have been designated as PSD Class I areas, where appreciable deterioration in air quality is considered significant. There are two PSD Class I areas in Arkansas: the Upper Buffalo Wilderness and the Caney Creek Wilderness. The nearest PSD Class I area is more than 60 miles from Little Rock AFB. One of the SRs (SR-219) approaches within 10 miles of the Upper Buffalo Wilderness in Newton County, Arkansas; another of the SRs (SR-232) approach within 25 miles of the Caney Creek Wilderness in Polk County. Emissions at Little Rock AFB due to the Proposed Action would be unlikely to have a substantial impact on any PSD Class I areas.

4.4.2 IMPACTS

4.4.2.1 Proposed Action

The Proposed Action would involve an increase in personnel and aircraft, as well as construction, demolition, and paving activities associated with the capital improvements program.

Construction Emissions. Emissions during the construction period were quantified to determine the potential impacts on regional air quality. Calculations of VOC, NO_x, sulfur oxides (SO_x), CO, and PM_{10} emissions from construction, grading, trenching, and paving activities were performed using USEPA emission factors compiled in the *Air Emissions Inventory Guidance Document for Mobile Sources at Air Force Installations* (O'Brien and Wade 2003), *California Environmental Quality Air Quality Handbook* (South Coast Air Quality Management District 1993), and *Calculations Methods for Criteria Air Pollution Emission Inventories* (Jagielski and O'Brien 1994). The emission factors for building construction include contributions from engine exhaust emissions (i.e., construction equipment, material handling, and workers' travel) and fugitive dust emissions (e.g., from grading activities). Demolition emissions evaluated include fugitive dust and transport of demolition debris offsite. Site preparation emissions include fugitive dust from ground disturbance, plus combustive emissions from heavy equipment during the construction period. Paving emissions include combustive emissions from bulldozers, rollers, and paving equipment, plus emissions from a dump truck hauling pavement materials to the site. Estimated annual emissions that would occur from construction and site preparation activities under the Proposed Action are presented in Table 4.4-1.

Emissions generated by construction projects are temporary in nature and would end when construction is complete. The emissions from fugitive dust (PM_{10}) would be considerably less than those presented in Table 4.4-1 due to the implementation of control measures in accordance with standard construction practices. For instance, frequent spraying of water on exposed soil during construction, proper soil stockpiling methods, and prompt replacement of ground cover or pavement are standard landscaping procedures that could be used to minimize the amount of dust generated during construction. Using efficient practices and avoiding long periods where engines are running at idle may reduce combustion emissions from construction equipment. Vehicular combustion emissions from construction worker commuting may be reduced by carpooling.

Table 4.4-1. Construction Emissions – Proposed Action

Source	*Construction Emissions (tons/year))*				
	CO	***VOC***	***NO_2***	***SO_2***	***PM_{10}***
Construction and Demolition	3.5	1.1	15.8	<0.1	1.2
Site Preparation	0.1	<0.1	0.2	<0.1	0.1
New Pavement	0.4	0.1	0.8	0.1	0.1
TOTAL	**4.0**	**1.2**	**16.8**	**0.1**	**1.3**

In general, combustive and fugitive dust emissions would produce localized, short-term elevated air pollutant concentrations (Table 4.4-1), which would not result in any long-term impacts on the air quality Pulaski County or AQCR 016. The temporary construction-related emissions of PM_{10} and SO_2 are not expected to adversely impact the air quality or visibility in Pulaski County or any PSD Class I area.

Operational Emissions. Air emissions from stationary sources, ground-based mobile sources, and C-130 aircraft operations at the Little Rock AFB airfield and in nearby airspaces (see Tables 3.4-2 and 3.4-3) after implementation of the Proposed Action would be expected to be approximately 16 percent higher than from current operations, due to the increase in aircraft and personnel. The fact that new equipment would be more efficient and have lower air pollutant emissions than their older counterparts at the Base would serve to offset a portion of the increase. The installation or modification of any air emission sources, such as boilers and heaters, emergency generators, corrosion control equipment, etc., to support incoming aircraft and personnel would need to be evaluated on an individual basis with regards to the stationary source regulations or permits applicable to the Base. Flying operations were calculated using default time-in-mode data, as described in Section 4.3.2. Table 4.4-2 identifies the expected increase in annual emissions from mobile and stationary sources at Little Rock AFB should the Proposed Action be implemented.

Table 4.4-2. Increase in Operational Emissions– Proposed Action

Source	*Emissions Increase (tons/year)*				
	CO	***VOC***	***NO_x***	***SO_2***	***PM_{10}***
Aircraft Operations (Airfield)	30.4	11.6	26.1	3.1	11.7
Aircraft Operations (Airspaces)	1.6	0.2	6.5	0.5	0.9
Ground-Based Mobile Sources	89.7	15.4	62.2	2.6	24.5
Stationary Sources	1.6	0.9	1.8	0.1	0.3

It is expected that these changes in emissions due to the Proposed Action would not result in any long-term impacts on the air quality Pulaski County or AQCR 016. The emissions of PM_{10} and SO_2 would not be expected to adversely impact the air quality or visibility in Pulaski County or any PSD Class I area.

Indirect Emissions. Implementation of the Proposed Action would result in an increase of 438 personnel commuting to Little Rock AFB. The increase in commuting emissions was calculated based on the assumption that the new personnel would commute an average of 10 miles each way, 5 days per week and 50 weeks per year, with an average vehicle occupancy of 1.1 personnel per vehicle. The vehicles were assumed to be a standard mix of vehicle types with an average model year of 2000 (O'Brien and Wade 2003). Table 4.4-3 shows the increase in annual commuting emissions to and from Little Rock AFB that would be expected due to implementation of the Proposed Action.

Table 4.4-3. Increase in Commuting Emissions to/from Little Rock AFB – Proposed Action

Source	*Emissions Increase (tons/year)*				
	CO	***VOC***	***NO_x***	***SO_2***	***PM_{10}***
Commuting	47.2	4.0	3.5	0.2	2.6

It is expected that these changes in emissions due to the Proposed Action would not result in any long-term impacts on the air quality Pulaski County or AQCR 016. The emissions of PM_{10} and SO_2 are not expected to adversely impact the air quality or visibility in Pulaski County or any PSD Class I area.

4.4.2.2 Alternative Action

Under the Alternative Action, the Base would be developed and populated to its maximum capability. The Alternative Action would involve an increase in personnel and aircraft, as well as construction, demolition, and paving activities associated with the capital improvements program.

Construction Emissions. Emissions during the construction period were quantified to determine the potential impacts on regional air quality using the same calculation methods and assumptions as described in Section 4.4.2.1. Estimated annual emissions that would be anticipated to occur from construction and site preparation activities under the Alternative Action are presented in Table 4.4-4.

Table 4.4-4. Construction Emissions – Alternative Action

Source	*Construction Emissions (tons/year))*				
	CO	***VOC***	***NO_2***	***SO_2***	***PM_{10}***
Construction and Demolition	31.4	9.8	144.6	0.0	10.3
Site Preparation	2.8	0.5	4.1	0.4	2.6
New Pavement	20.7	4.3	46.4	3.7	3.1
TOTAL	**55.0**	**14.6**	**195.0**	**4.1**	**16.0**

Emissions generated by construction projects are temporary in nature and would end when construction is complete. The emissions from fugitive dust (PM_{10}) would be considerably less than those presented in Table 4.4-4 due to the implementation of control measures in accordance with standard construction practices. For instance, frequent spraying of water on exposed soil during construction, proper soil stockpiling methods, and prompt replacement of ground cover or pavement are standard landscaping procedures that could be used to minimize the amount of dust generated during construction. Using efficient practices and avoiding long periods where engines are running at idle may reduce combustion emissions from construction equipment. Vehicular combustion emissions from construction worker commuting may be reduced by carpooling.

In general, combustive and fugitive dust emissions would produce localized, short-term elevated air pollutant concentrations (Table 4.4-4), which would not result in any long-term impacts on the air quality Pulaski County or AQCR 016. The temporary construction-related emissions of PM_{10} and SO_2 are not expected to adversely impact the air quality or visibility in Pulaski County or any PSD Class I area.

Operational Emissions. Air emissions from stationary sources, ground-based mobile sources, and C-130 aircraft operations at the Little Rock AFB airfield and in nearby airspace (see Table 3.4-3) following implementation of the Alternative Action would be expected to be approximately 50 percent higher than from current operations, due to the increase in aircraft and personnel. The fact that new equipment would be more efficient and have lower air pollutant emissions than their older counterparts at the Base would serve to offset a portion of the increase. The installation or modification of any air emission sources, such as boilers and heaters, emergency generators, corrosion control equipment, etc., to support incoming aircraft and personnel would need to be evaluated on an individual basis with regards to the stationary source regulations or permits applicable to the Base. Flying operations were calculated using default time-in-mode data, as described in Section 3.4.2. Table 4.4-5 identifies the increase in annual

emissions from stationary and mobile sources at Little Rock AFB that would be expected due to implementation of the Alternative Action.

Table 4.4-5. Increase in Operational Emissions– Alternative Action

Source	*Emissions Increase (tons/year)*				
	CO	***VOC***	***NO_x***	***SO_2***	***PM_{10}***
Aircraft Operations (Airfield)	95.1	36.3	81.4	9.6	36.5
Aircraft Operations (Airspaces)	4.9	0.7	20.4	1.7	2.9
Ground-Based Mobile Sources	280.4	48.1	194.2	8.0	76.7
Stationary Sources	4.9	2.7	5.7	0.3	1.0

It is expected that these changes in emissions due to the Alternative Action would not result in any long-term impacts on the air quality of Pulaski County or AQCR 016. The emissions of PM_{10} and SO_2 are not expected to adversely impact the air quality or visibility in Pulaski County or any PSD Class I area.

Indirect Emissions. Implementation of the Alternative Action could result in an increase of 5,049 personnel commuting to Little Rock AFB. The increase in commuting emissions was calculated based on the assumption that the new personnel would commute an average of 10 miles each way, 5 days per week and 50 weeks per year, with an average vehicle occupancy of 1.1 personnel per vehicle. The vehicles were assumed to be a standard mix of vehicle types with an average model year of 2000 (O'Brien and Wade 2003). Table 4.4-6 shows the increase in annual commuting emissions to and from Little Rock AFB that would be expected due to implementation of the Alternative Action.

Table 4.4-6. Increase in Commuting Emissions to/from Little Rock AFB – Alternative Action

Source	*Emissions Increase (tons/year)*				
	CO	***VOC***	***NO_x***	***SO_2***	***PM_{10}***
Commuting	592.2	50.4	44.4	2.6	33.0

Because Pulaski County is designated as attainment for all criteria pollutants, it is expected that these changes in emissions due to the Proposed Action would not result in long-term impacts on the air quality Pulaski County or AQCR 016. The emissions of PM_{10} and SO_2 are not expected to adversely impact the air quality or visibility in Pulaski County or any PSD Class I area.

4.4.2.3 No Action Alternative

Under the No Action Alternative, no construction emissions would occur and the Base's operational and indirect emissions would be identical to current baseline presented in Chapter 3.0.

4.4.2.4 Cumulative Impacts

Other proposed and/or ongoing activities within the ROI, as described in Section 2.7, are expected to generate temporary construction emissions over the short term and to a lesser extent, sustained increases in operational emissions over the long term (beddown of additional aircraft). Given the suite of construction activities within the ROI, the short-term temporary construction emissions would be expected over the next several years. These temporary variations in emissions are typical for an active USAF base and its surrounding region, and are not atypical for this region. For the most part, impacts would be temporary in nature, and would result in only minor long-term impacts to the air quality of Pulaski County or AQCR 016.

4.5 AIRSPACE MANAGEMENT AND AIR TRAFFIC CONTROL

4.5.1 METHODOLOGY

The potential effects of the alternative actions on the existing airspace environment were assessed by considering the changes in airspace utilization that could result from the proposals.

The type, size, shape, and configuration of individual airspace elements in a region are based upon, and are intended to satisfy, competing aviation requirements. Potential impacts could occur if air traffic in the region and/or the ATC systems were encumbered by changed flight activities associated with the Proposed Action or an alternative. Impacts could result if such changes adversely affected (1) ATC systems and/or facilities; (2) movement of other air traffic in the area; or (3) airspace already designated and used for other purposes supporting military, commercial, or general aviation.

4.5.2 IMPACTS

4.5.2.1 Proposed Action

Under the Proposed Action, which would implement the recommendations of the BRAC, up to 12 additional C-130-type aircraft would be stationed at Little Rock AFB. This represents an approximate 16 percent increase in airframes assigned to Little Rock AFB. If a linear expansion in aviation operations for these aircraft is assumed, annual operations at the airfield would increase from approximately 116,575 to 134,900. Based on throughput capacity models

developed by the FAA, an airfield such as that at Little Rock AFB is capable of handling approximately 179,000 annual operations, even under adverse weather conditions. Refer to Appendix B for additional details. No adverse impacts to the airspace around Little Rock AFB or the existing ATC systems would be anticipated.

Increasing the number of C-130 sorties by 16 percent could, under certain circumstances, begin to impact the scheduling and availability of military training airspace. Currently, the AADZ is used for airdrops two days per week on Tuesday and Thursday. On Monday, Wednesday, and Friday, BJDZ is utilized for airdrops while AALZ is utilized for unimproved surface assault landing training and as a tool to alleviate traffic pattern saturation at the Little Rock AFB AZ. However, operations on AADZ and BJDZ cannot be run concurrently due to DZ proximity (which involves airspace deconfliction, ATC management, and safety) and DZ support contract staffing. This could result in limiting DZ availability (Time-on-Target) for scheduled operations at some times.

The issues identified above would not cause impacts on a daily basis, nor prevent implementation of the Proposed Action. Furthermore, there are management actions that could be considered to minimize potential scheduling issues. For example, a normal flight usually consists of a 2-ship or 4-ship formation; however, flights have been increased to 6-ship formations, which would increase aircrew training availability. Also, alternative DZs in the region could be utilized. There is a cost associated with this option, because it would involve increased flight time, and there would be costs associated with DZ clean-up since all airdrop-product must be collected and transported back to Little Rock AFB.

The airfield and airspace assets in general, are physically able to accommodate the increased number of C-130 operations associated with the Proposed Action.

4.5.2.2 Alternative Action

Under the Alternative Action, which would result in an expansion to Little Rock AFB's maximum potential, up to 39 additional C-130 aircraft could be stationed at Little Rock AFB. This would represent an approximate 50 percent increase in assigned airframes at Little Rock AFB. If a linear expansion in aviation operations for these aircraft is assumed, annual operations at the airfield would increase from approximately 116,575 to 173,900. As presented above, based on throughput capacity models developed by the FAA, an airfield such as that at Little Rock AFB is capable of handling approximately 179,000 annual operations, even under adverse weather conditions. Refer to Appendix B for additional details. Although the projected increase in operations approaches the capacity threshold, there is still some level of unused capacity. No adverse impacts to the airspace around Little Rock AFB or the existing ATC systems would be anticipated.

The increased number of C-130 sorties required for an additional 39 aircraft could, under certain circumstances, stress the availability of required military training airspace. Currently, the AADZ is used for airdrops two days per week on Tuesday and Thursday. On Monday, Wednesday, and Friday, BJDZ is utilized for airdrops while AALZ is utilized for unimproved surface assault landing training and to alleviate traffic pattern saturation at the Little Rock AFB AZ.

There are circumstances that can impact the availability of these military training airspace resources. Operations on AADZ and BJDZ cannot be run concurrently due to DZ proximity (which involves airspace deconfliction, ATC management, and safety) and DZ support contract staffing. These considerations can result in limited DZ availability (Time-on-Target) for scheduled operations at some times.

As assigned aircraft and aircrews increase, demands on these resources would also increase. While the issues identified above would not result in scheduling conflicts on a daily basis, nor even preclude the assignment of 39 additional C-130 aircraft at Little Rock AFB, they should be considered. There are management actions that could be considered to minimize these issues. As mentioned above, a normal flight usually consists of a 2-ship or 4-ship formation; however, flights have been increased to 6-ship formations, which would increase aircrew training availability. Also, alternative DZs in the region could be utilized. There is a cost associated with this option, because it would involve increased flight time, and there would be costs associated with DZ clean-up since all airdrop-product must be collected and transported back to Little Rock AFB.

The airfield and airspace assets in general, are physically able to accommodate the increased number of C-130 operations associated with Alternative Action.

4.5.2.3 No Action Alternative

Under the No Action Alternative, no additional aircraft would be stationed at Little Rock AFB. Operations at the airfield and in the military training airspace would continue at the same levels as under current conditions.

4.5.2.4 Cumulative Impacts

Other proposed and/or ongoing activities within the ROI, as described in Section 2.7, are not expected to have any impacts on aviation resources in the ROI. Cumulative impacts to aviation resources would be expected to be minimal.

4.6 NOISE

4.6.1 METHODOLOGY

In this section, noise associated with proposed construction activities and aircraft operations at Little Rock AFB is evaluated and compared with current conditions to assess potential impacts. Data developed during this process also supports analyses in other resource areas.

Based on numerous sociological surveys and recommendations of federal interagency councils, the most common benchmark referred to is an L_{dn} of 65 dBA. This threshold is often used to determine residential land use compatibility around airports, highways, or other transportation corridors. Two other average noise levels are also useful:

- An L_{dn} of 55 dBA was identified by the USEPA as a level ". . . requisite to protect the public health and welfare with an adequate margin of safety" (USEPA 1974). Noise may be heard, but there is no risk to public health or welfare.

- An L_{dn} of 75 dBA is a threshold above which effects other than annoyance may occur. It is 10 to 15 dBA below levels at which hearing damage is a known risk (Occupational Safety and Health Administration 1983). However, it is also a level above which some adverse health effects cannot be categorically discounted.

Public annoyance is the most common impact associated with exposure to elevated noise levels. When subjected to L_{dn} of 65 dBA, approximately 12 percent of persons so exposed will be "highly annoyed" by the noise. At levels below 55 dBA, the percentage of annoyance is correspondingly lower (less than 3 percent). The percentage of people annoyed by noise never drops to zero (some people are always annoyed), but at levels below 55 dBA it is reduced enough to be essentially negligible.

4.6.2 IMPACTS

4.6.2.1 Proposed Action

Under the Proposed Action, the 314 AW would implement their CIP, and incorporate the actions directed by the 2005 BRAC Commission, including an increase of up to 12 C-130 Aircraft. These proposals have the potential to create noise impacts in the ROI.

Construction Noise. Construction would most likely occur over an extended time-frame (i.e., five years), and only a relatively small number of projects would be expected to be ongoing simultaneously. Therefore, noise associated with active construction sites would be expected to be intermittent and of relatively limited duration. A hypothetical scenario was developed to

assess potential noise associated with construction activities on a construction site. Primary noise sources during such activity would be expected to be heavy vehicles and earth moving equipment. Table 4.6-1 shows sound levels associated with typical heavy construction equipment under varying modes of operation.

Table 4.6-1. Typical Sound Levels of Construction Equipment

Equipment	SOUND LEVEL (IN DBA) UNDER INDICATED OPERATIONAL MODE[1]		
	Idle Power	***Full Power***	***Moving Under Load***
Forklift	63	69	91
Backhoe	62	71	77
Dozer	63	74	81
Front-End Loader	60	62	68
Dump Truck	70	71	74

Note: [1]Measured at 125 feet from source
Source: USAF 1998

For the assessment of construction noise, a hypothetical "construction area" was designated that approximated the estimated area that would be involved in supporting a major project under the proposal.

The first step in the analysis was to estimate equipment usage and calculate the total acoustic energy that would be expected to be generated on the site. These data also provided information on each piece of equipment's relative contribution to the total amount of acoustic energy generated on the site. Next, the equipment was spatially distributed throughout the construction zone considering "most likely" areas of operation. This yielded an equipment-weighted contribution to total site acoustic energy at different points throughout the site. With this spatial distribution, it was then possible to calculate a mean and standard deviation for the distribution along an axis running through the site.

These data were then used to normally distribute the total site energy throughout the site. Finally, the normally distributed energy from multiple source points throughout the site was aggregated at a range of points at varying distances from the site edge. This allowed a determination at those points of the total acoustic energy that had emanated off-site.

Calculations based on this conservative scenario indicate an equivalent noise level over an $L_{eq(8)}$ of 67 dBA at a distance of 500 feet from the edge of the site. This is then normalized to an equivalent noise level over an $L_{eq(24)}$ of 62 dBA. Since no construction activity would be expected to occur at night, this would be equivalent to L_{dn} 62. At a distance of 1,000 feet from the site, noise levels are $L_{eq(8)}$ 62 dBA and $L_{eq(24)}$ 58 dBA. Due to the conservative nature of the

scenario, and the fact that sound attenuation only due to spherical spreading was considered, actual levels emanating off-site would be expected to be lower.

It should be noted that the areas involving construction are situated within areas already exposed to elevated noise from airfield operations. Many projects are located in, or immediately proximate to air-side locations directly supporting aircraft operations (runways, taxi-ways, parking ramps, etc.). Many of these areas are well within the L_{dn} 65 contour created by aircraft noise. Construction noise emanating off-site would probably be noticeable in the immediate site vicinity, but would not be expected to create adverse impacts, or alter noise contours associated with aircraft operations. Furthermore, construction-related noise is intermittent and transitory, ceasing at the completion of construction. The long-term acoustic environment on Little Rock AFB would not be expected to be impacted by construction activities.

Aircraft Noise. To assess noise impacts associated with an increase of 12 C-130 aircraft at Little Rock AFB, an estimated 16 percent increase in Little Rock AFB based aircraft operations is assumed. Table 4.6-2 reflects this change in daily operations. Average daily operations at Little Rock AFB would increase from approximately 448 to approximately 519.

Table 4.6-2. Average Daily Operations at Little Rock AFB under Proposed Action[1]

	ARRIVALS		DEPARTURES		CLOSED PATTERNS		
Aircraft	***Day***	***Night***	***Day***	***Night***	***Day***	***Night***	***Total***
Based	81.058	15.536	81.054	15.539	267.142	51.214	511.43
Transient/ Other	3.136	0	3.136	0	1.090	0	7.362
Total	**84.194**	**15.536**	**84.190**	**15.539**	**268.232**	**51.214**	**518.905**

Notes: 1. Daily operations are based on averages of annual operations; therefore, numbers do not round.
Source: Little Rock AFB 2005a

Noise contours associated with the increased operations are shown in Figures 4.6-1 and 4.6-2. Land areas exposed to elevated noise levels are compared with current conditions in Table 4.6-3, and changes in noise levels at sensitive land use areas are compared in Table 4.6-4. Under the Proposed Action, the increase up to an additional 12 C-130 aircraft would result in higher noise levels both on-base and off-base; however, increases would be relatively minimal and no land uses would be rendered incompatible. The number of persons expected to experience noise levels above 65 L_{dn} is estimated to increase by 34 percent under the Proposed Action, from 963 persons under existing conditions to an estimated 1,299 persons. Noise levels would remain well below any thresholds that would be expected to result in notable human annoyance.

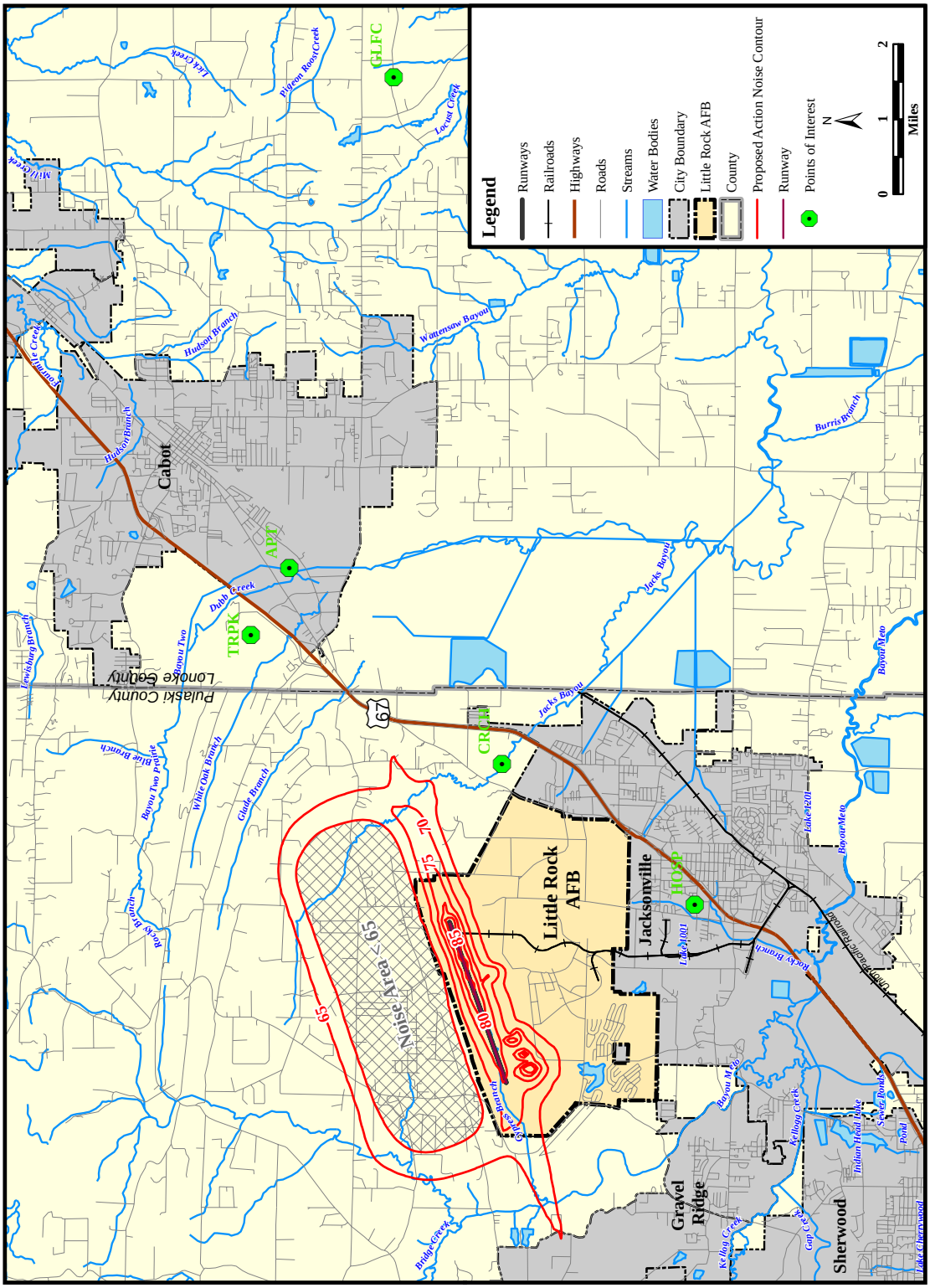


Figure 4.6-1. Noise Contours and Noise Sensitive Receptors Under the Proposed Action in the Vicinity of Little Rock AFB, Arkansas

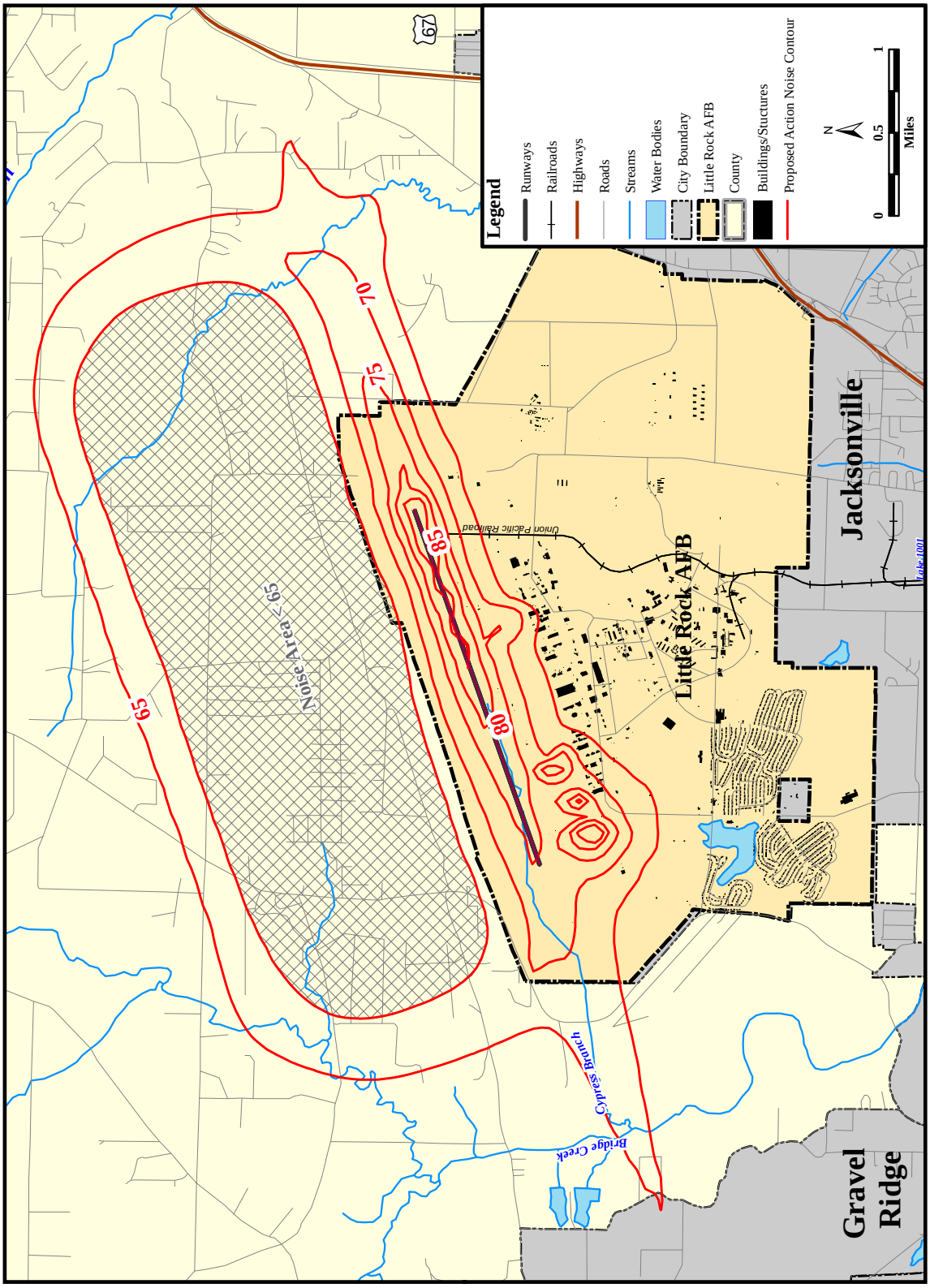


Figure 4.6-2. Noise Contours Under the Proposed Action on Little Rock AFB, Arkansas

Table 4.6-3. Land Area Exposed to Elevated Noise under the Proposed Action

Sound Level (In L_{dn})	ACRES OF LAND				*Population Under Proposed Action Contours*
	Baseline	*Proposed*	*Net Change*	*Percent Change*	
On Base					
65 – 70	728.6	695.4	- 33.2	- 4.6	266
70 – 75	550.6	592.9	+ 42.3	+ 7.7	212
75 – 80	243.3	319.1	+ 75.8	+ 31.2	114
80 – 85	120.7	132.2	+ 11.5	+ 9.5	47
> 85	30.2	46.0	+ 15.8	+ 52.3	16
Total > 65	**1,673.4**	**1,785.6**	**+ 112.2**	**+ 6.7**	**655**
Off Base					
65 – 70	1,250.2	2,185.4	+ 935.2	+ 74.8	613
70 – 75	118.7	183.0	+ 64.3	+ 54.2	27
75 – 80	3.2	16.8	+ 13.6	+ 425.0	4
80 – 85	0.0	0.0	0.0	N/A	0
> 85	0.0	0.0	0.0	N/A	0
Total > 65	**1,372.1**	**2,385.2**	**+ 1,013.1**	**+ 73.8**	**644**
Total Land Area					
65 – 70	1,978.8	2,880.8	+ 901.9	+ 45.6	879
70 – 75	669.3	775.9	+ 106.6	+ 15.9	239
75 – 80	246.5	335.9	+ 89.4	+ 36.3	118
80 – 85	120.7	132.2	+ 11.5	+ 9.5	47
> 85	30.2	46.0	+ 15.8	+ 52.3	16
Total > 65	**3,045.5**	**4,170.8**	**+ 1,125.2**	**+ 36.9**	**1,299**

Table 4.6-4. Specific Point Noise Exposure under Proposed Action

Point ID	***Description***	**EXPOSURE (IN L_{DN})**		***Change (In L_{dn})***
		Current	***Proposed***	
APT	Apartment Housing	53.0	54.0	+ 1.0
CRCH	A Church	59.5	61.2	+ 1.7
GLFC	A Golf Course	34.0	34.1	+ 0.1
HOSP	A Hospital	42.7	43.1	+ 0.4
TRPK	A Trailer Park	43.9	44.9	+ 1.0

Source: Moulton 1990

As shown, higher noise levels result both on- and off-base. The decrease in the 65 to 70 L_{dn} contour on-base is a result of the overall expansion of all contours. As shown, increases are relatively minimal, and no land uses are rendered incompatible as a result of the increased noise levels.

Noise levels would also increase in the military training airspace under the Proposed Action. Noise associated with the proposed increased operations is compared with current conditions in Table 4.6-5. As shown, noise levels remain well below any thresholds that would be expected to result in notable human annoyance.

Table 4.6-5. Noise Levels in Military Training Airspace under the Proposed Action

Airspace	***Current Noise Level (In L_{dnmr})***	***Proposed Action Noise Level (In L_{dnmr})***
219A	39.6	40.2
219B	40.7	41.2
220A	46.2/47.7	46.8/48.3
220B	47.8	48.4
229A	32.9/34.4	33.4/34.9
229B	35.3/36.8/37.6	35.8/37.3/38.1
230A	29.3/30.8	29.9/31.5
230C	24.7/27.0	25.0/27.3
231A	32.2/33.7	32.7/34.2
231B	34.9/37.2	35.4/37.7
232A	44.7/46.2	45.2/46.7
232B	45.9	46.4
246A	36.9/38.4	37.5/39.0
246B	37.9	38.4
AADZ	62.6	63.1
BJDZ	63.9	64.5

Note: Multiple noise levels in the table reflect varying route widths.
Source: Lucas and Calamia 1996

4.6.2.2 Alternative Action

Under the Alternative Action, facilities would be developed to the maximum extent supportable by the geographic area available on the installation. Also, an additional 39 C-130 aircraft would be stationed at Little Rock AFB, bringing the total (both PAI and BAI) assigned aircraft inventory to 124 C-130 aircraft.

Construction Noise. Under this alternative, the scope of facility construction, renovation, and demolition would be greater than under the Proposed Action. However, the accomplishment of these activities would be as described under the Proposed Action. The only difference that would be expected would be an extended time frame over which construction activities would occur. During any one period, noise associated with these activities would be expected to be more or less, as described under the Proposed Action.

Aircraft Noise. The assignment of additional aircraft to Little Rock AFB would result in increased operations around the airfield, and in the military training airspace. To assess noise impacts associated with this change, an estimated 50 percent increase in based aircraft operations is assumed. Table 4.6-6 reflects this change in daily operations. Average daily operations at Little Rock AFB would increase from approximately 448 existing operations to approximately 669 operations.

Table 4.6-6. Average Daily Operations at Little Rock AFB under the Alternative Action[1]

	ARRIVALS		DEPARTURES		CLOSED PATTERNS		
Aircraft	***Day***	***Night***	***Day***	***Night***	***Day***	***Night***	***Total***
Based	106.643	18.263	106.639	18.267	351.462	60.204	661.478
Transient/ Other	3.136	0	3.136	0	1.090	0	7.362
Total	**109.779**	**18.263**	**109.775**	**18.267**	**352.552**	**60.204**	**668.840**

Notes: 1. Daily operations are based on averages of annual operations; therefore, numbers do not round.
Source: Little Rock AFB 2005a

Noise contours associated with the increased operations are shown in Figures 4.6-3 and 4.6-4. Land areas exposed to the elevated noise levels associated with the alternative action are compared with current conditions in Table 4.6-7, and changes in noise levels at sensitive land use areas are compared in Table 4.6-8. As shown, higher noise levels result both on- and off-base. The decrease in the 65 to 70 L_{dn} contour on-base is a result of the overall expansion of all contours. Under the Alternative Action, higher noise levels would result both on-base and off-base; however, projected increases would be below levels that would be expected to create high annoyance to the population overflown, and no land uses would be rendered incompatible. The number of persons expected to experience noise levels above 65 L_{dn} is estimated to increase by 63 percent under the Alternative Action, from 963 persons under existing conditions to an estimated 1,572 persons, although no sensitive noise receptors are anticipated to be affected.

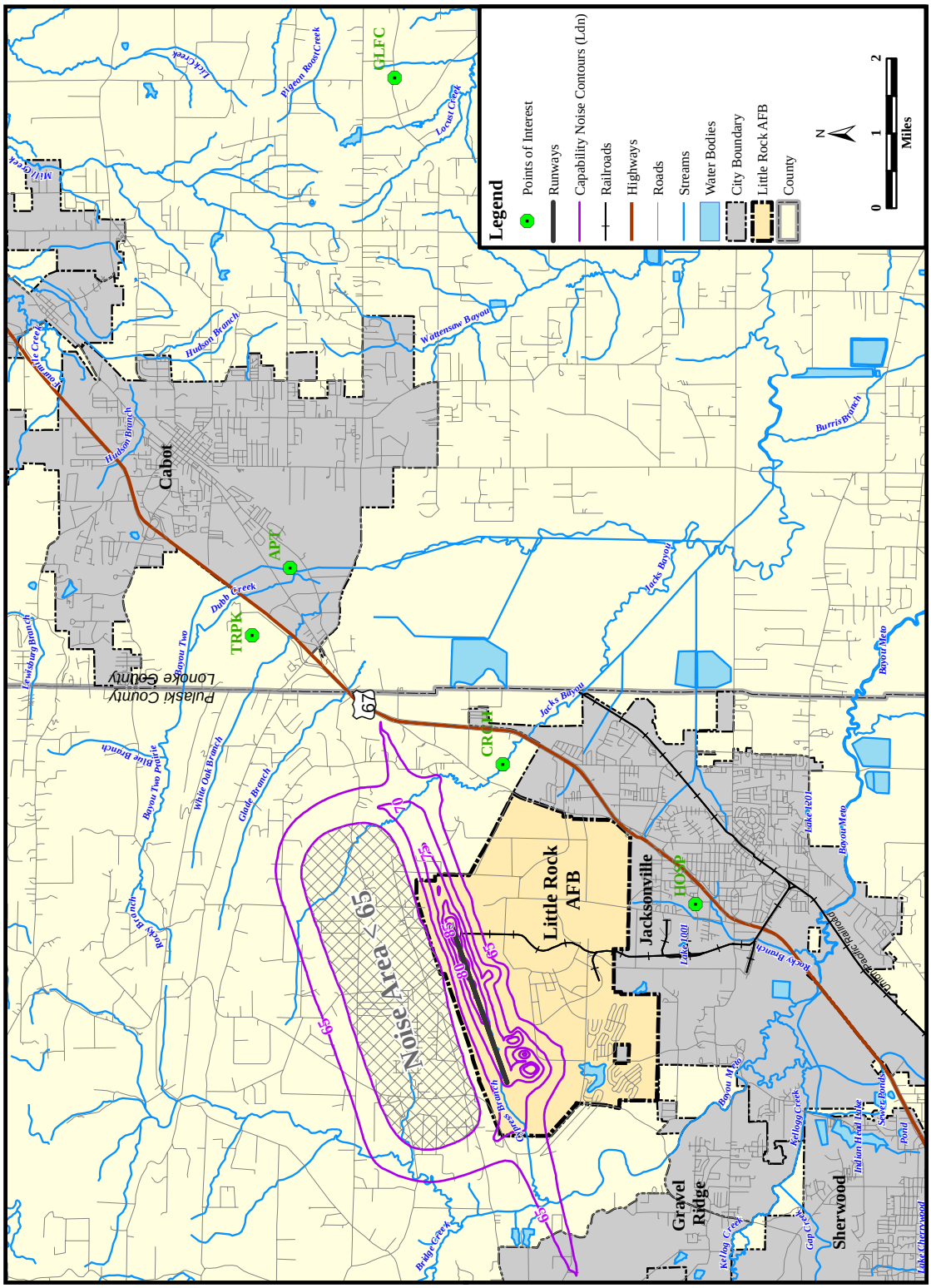


Figure 4.6-3. Noise Contours and Noise Sensitive Receptors Under the Alternative Action in the Vicinity of Little Rock AFB, Arkansas

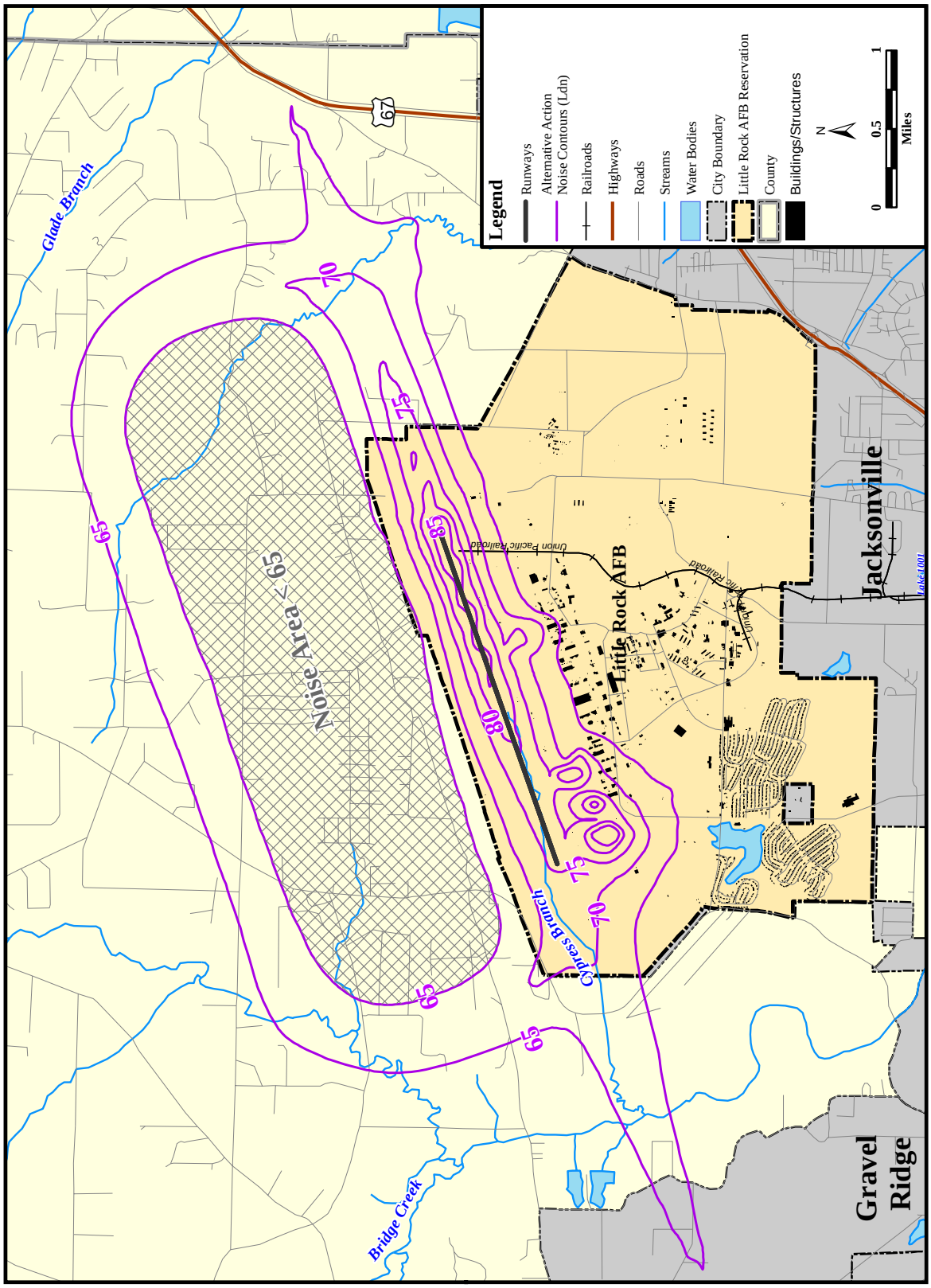


Figure 4.6-4. Noise Contours Under the Alternative Action on Little Rock AFB, Arkansas

Table 4.6-7. Land Area Exposed to Elevated Noise under the Alternative Action

Sound Level (In L_{dn})	ACRES OF LAND				*Population Under Alternative Action Contours*
	Baseline	*Proposed*	*Net Change*	*Percent Change*	
On Base					
65 – 70	728.6	695.0	- 69.6	-9.6	258
70 – 75	550.6	611.8	+ 61.2	+ 11.1	220
75 – 80	243.3	387.1	+ 143.8	+ 59.7	139
80 – 85	120.7	155.1	+ 34.4	+ 28.5	56
> 85	30.2	55.2	+ 25.0	+ 82.8	20
Total > 65	**1,673.4**	**1,868.2**	**+ 194.8**	**+ 11.6**	**692**
Off Base					
65 – 70	1,250.2	2,847.5	+ 1,597.3	+ 127.8	834
70 – 75	118.7	228.2	+ 109.5	+ 92.2	39
75 – 80	3.2	35.5	+ 32.3	+ 1,009.4	7
80 – 85	0.0	0.0	0.0	N/A	0
> 85	0.0	0.0	0.0	N/A	0
Total > 65	**1,372.1**	**3,111.2**	**+ 1,739.1**	**+ 126.7**	**880**
Total Land Area					
65 – 70	1,978.8	3,506.5	+ 1,527.6	+ 77.2	1,092
70 – 75	669.3	840.0	+ 170.7	+ 25.5	259
75 – 80	246.5	422.6	+ 176.1	+ 71.4	145
80 – 85	120.7	155.1	+ 34.4	+ 28.5	56
> 85	30.2	55.2	+ 25.0	+ 82.8	20
Total > 65	**3,045.5**	**4,979.4**	**+ 1,933.8**	**+ 63.5**	**1,572**

Table 4.6-8. Specific Point Noise Exposure under the Alternative Action

Point ID	***Description***	**EXPOSURE (IN L_{DN})**		***Change (In L_{dn})***
		Current	***Alternative***	
APT	Apartment Housing	53.0	54.8	+ 1.8
CRCH	A Church	59.5	62.0	+ 2.5
GLFC	A Golf Course	34.0	35.0	+ 1.0
HOSP	A Hospital	42.7	44.1	+ 1.4
TRPK	A Trailer Park	43.9	45.7	+ 1.8

Source: Moulton 1990

As indicated, all currently-existing land uses remain compatible.

Noise levels also increase in the military training airspace under the Alternative Action. Noise associated with increased operations is compared with current conditions in Table 4.6-9.

Table 4.6-9. Noise Levels in Military Training Airspace under the Alternative Action

Airspace	***Current Noise Level (In L_{dnmr})***	***Proposed Action Noise Level (In L_{dnmr})***
219A	39.6	41.7
219B	40.7	42.9
220A	46.2/47.7	48.3/49.8
220B	47.8	49.9
229A	32.9/34.4	35.1/36.6
229B	35.3/36.8/37.6	37.5/39.0/39.8
230A	29.3/30.8	31.3/32.8
230C	24.7/27.0	27.3/29.6
231A	32.2/33.7	34.3/35.8
231B	34.9/37.2	37.0/39.3
232A	44.7/46.2	46.8/48.3
232B	45.9	48.0
246A	36.9/38.4	39.0/40.5
246B	37.9	40.0
AADZ	62.6	64.6
BJDZ	63.9	66.0

Note: Multiple noise levels in the table reflect varying route widths.
Source: Lucas and Calamia 1996

Noise resulting from operations on the SRs remains well below levels that would be expected to create high annoyance to any major portion of the population overflown. Although noise associated with use of the DZs under this alternative approaches or exceeds 65 L_{dnmr}, it should be noted that these areas are regularly exposed to elevated noise, and due to the constrained flight tracks through the DZs, noise is concentrated in the area, attenuating rapidly in areas off the DZ itself.

4.6.2.3 No Action Alternative

Under the No Action Alternative, no proposed construction activities would occur, and no additional aircraft would be assigned to Little Rock AFB. Since no construction would occur, the noise associated with such activities would not result. Since no changes to aircraft operations or other transportation activities would result from this alternative, noise levels at Little Rock AFB would remain as described in Section 3.5.

4.6.2.4 Cumulative Impacts

Other proposed and/or ongoing activities within the ROI, as described in Section 2.7, are expected to generate construction noise over the duration of each project. These projects are dispersed throughout the Little Rock AFB/Jacksonville region and are not atypical sources of noise in the community. Construction noise emanating off-site as a result of the Proposed Action and the activities described in Section 2.7 would probably be noticeable only in the immediate construction site vicinity, but would not be expected to create adverse impacts. In addition, aircraft noise associated with the Proposed or Alternative Actions in concert with those actions described in Section 2.7 would similarly not be expected to create adverse impacts as no land uses would be rendered incompatible as a result of the actions. Cumulative impacts from noise would be expected to be minimal.

4.7 LAND USE AND VISUAL RESOURCES

4.7.1 METHODOLOGY

Land use impacts can result if an action displaces an existing use or reduces the suitability of an area for its current, designated, or formally planned use. In addition, a proposed activity may be incompatible with local plans and regulations, or conflict with management objectives of a federal or state agency of an affected area. The methodology to assess impacts on individual land uses requires identifying those uses, as well as affected land use planning and control policies and regulations and determining the degree to which they would be affected by the proposal.

To assess impacts to visual resources, areas that have high visual value or low tolerance for visible modification or have prescribed guidelines are identified. Visual impacts are assessed by determining how, and to what extent, a proposed action would alter the overall visual character of the area.

4.7.2 IMPACTS

4.7.2.1 Proposed Action

The Proposed Action would have no direct effect on land use or visual resources. The proposed construction, renovation and demolition projects would modify the general land use patterns on Little Rock AFB. These projects are not consistent with the current General Plan; however, that plan is currently being updated to address proposed development at Little Rock AFB. The extent of new construction, renovation and demolition would somewhat alter the overall visual character of the area. Any development activity undertaken on Little Rock AFB would be consistent with their established Architectural Compatibility Guide to ensure that the base character and aesthetic qualities are retained.

The modification to aircraft operations, including an increase in night-time flying operations, does not appreciably increase the noise contours. Figures 4.6-1 and 4.6-2 and Table 4.6-3 present the new contours and affected acreage. Under this alternative, an additional 1,125.2 acres (from baseline) would be located under the noise contours, with an additional 336 persons living in this area. There are no sensitive land use areas underlying these contours. However, there are residential areas currently exposed to aircraft overflight that will continue to be affected. Land use patterns, ownership, and management plans would not be expected to change based on the modification of aircraft operations.

4.7.2.2 Alternative Action

Under the Alternative Action, no direct effect on land use or visual resources is anticipated. The proposed construction, renovation, and demolition projects would modify the general land use patterns on Little Rock AFB and they are not consistent with the current General Plan. However, that plan is currently being updated to address proposed development at the base. The General Plan could be further modified to incorporate this alternative as presented in Appendix B.

This alternative would appreciably reduce the amount of open space on the installation. Although acreage constrained by environmental factors (i.e., wetlands, floodplains, safety easements, etc.) would remain open, many areas that currently provide vistas for residents and visitors would be developed. The landscape character and perceived aesthetic value of the installation could be compromised with insensitive building placement and design. In order to

ensure the continued aesthetic quality of the installation, all new development should follow the Architectural Compatibility Guide and other sound planning principals.

Under this alternative, an additional 1,933.8 acres (from baseline) would be located under the noise contours, with an additional 609 persons living in this area. Figures 4.6-3 and 4.6-4 and Table 4.6-7 present the contours and affected acreage associated with this alternative. There are no sensitive land use areas underlying these contours. Land use patterns, ownership and management plans are not expected to change based on the modification to aircraft operations.

4.7.2.3 No Action Alternative

No impacts to land use or visual resources are expected under the No Action Alternative. Little Rock AFB would continue to manage on-base development activity with the Base General Plan and Architectural Compatibility Guide. Coordination with local communities affected by overflight activity would continue with the AICUZ program.

4.7.2.4 Cumulative Impacts

Other proposed and/or ongoing activities within the ROI, as described in Section 2.7, are not expected to substantially modify or render existing land uses incompatible either at Little Rock AFB or in the general ROI. The long-term objective at Little Rock AFB is to combine like activities spatially, and the projects described in this analysis work toward that end. There would be a general overall positive result from implementation of these projects. Cumulative impacts to land use and visual resources within the ROI would be expected to be minimal.

4.8 SOCIOECONOMICS

4.8.1 METHODOLOGY

In order to assess the potential socioeconomic impacts of the Proposed Action, demographic and economics characteristics at Little Rock AFB, the City of Jacksonville, and Pulaski County were analyzed, as presented in Section 3.8.2. Potential socioeconomic consequences were assessed in terms of effects of the proposed actions on the local economy, typically driven by changes in project personnel or expenditure levels. Economic multipliers, migration ratios, and other factors are utilized to determine the total economic effect of project-related changes on regional socioeconomic attributes.

For this EA, potential socioeconomic impacts are evaluated for several factors associated with the Installation Development proposal at Little Rock AFB: personnel changes, aircraft operations, and facility modifications. Personnel changes associated with the action alternatives can result in population increases in the region, and related changes in housing and service

demand, and induced employment and income. Changes in aircraft operations may affect the noise environment surrounding the base, resulting in changes in public annoyance levels experienced by the noise-effected population. Finally, construction activity associated with facility modifications on base often generates temporary economic benefits to the region in terms of employment and income, however lasting only for the duration of the construction period.

The anticipated environmental effects of the Proposed Action and alternatives are evaluated for their potential impact to environmental justice populations and the potential for special risks to children. Analysis determined whether there would be a disproportionately high and/or adverse effect to minority or low-income communities or adverse safety or health risks to children associated with noise, pollutant transport, and other conditions in the existing and proposed project areas. Analysis focuses on the exposure of these communities to anticipated environmental effects, identifying potential areas of concern by demographics of known population distributions.

4.8.2 POTENTIAL IMPACTS

4.8.2.1 Proposed Action

Under the Proposed Action, Little Rock AFB would receive an additional 600 full-time military personnel in support of the expanded mission, representing an increase of 8.4 percent to the existing base employment of 7,163 personnel, and 5.0 percent to the existing Jacksonville employment of 11,951. Based on existing family size ratios, it is anticipated that 640 military dependents would accompany the incoming military personnel, yielding a direct population impact of 1,240 persons. An increase of this size would raise the Little Rock AFB population to 14,706, representing an increase of 9.2 percent in the base population, 4.1 percent in Jacksonville population, and less than 1 percent in the Pulaski County population. While these incoming personnel and their households would generate added demand for housing and services, the increase would be expected to result in only minor socioeconomic consequences.

As stated above, construction activities associated with facility modifications under the Proposed Action would generate a number of jobs during the construction period, and contribute to local earnings and induced spending. These effects would be temporary, however, only occurring for the duration of the construction period. No permanent or long-lasting socioeconomic impacts would be anticipated as a result of construction activity associated with the Proposed Action.

Under the Proposed Action, Little Rock AFB would receive an additional 600 full-time military personnel in support of the expanded mission, raising the Little Rock AFB population to 14,706, representing an increase of 9.2 percent in the base population, 4.1 percent in Jacksonville population, and less than one percent in the Pulaski County population. While these incoming

personnel and their households would generate added demand for housing and services, an increase of this anticipated magnitude is not expected to result in significant environmental justice consequences or special risks to children.

Construction-related concerns related to environmental justice and special risks to children include safety, noise, pollutants, and hazardous materials. Specific issues of concern involve potential accidents at construction sites, exposure to asbestos and lead-based paint, and noise from construction activity. Given that children have physiologic and behavioral characteristics that make them more vulnerable than adults to damage from environmental effects, evaluation of potential environmental exposures associated with the alternatives requires special consideration. Safety precautions to protect children in areas surrounding the work sites would include adequate measures to restrict access, minimization of hazards associated with construction activities, and proper handling and disposal of hazardous materials. Such mitigation measures would serve to offset the potential for impacts to any age group, including children. Noise associated with construction would be intermittent and short in duration, not contributing any appreciable effect to the existing acoustic environmental in the area.

Under the Proposed Action, Little Rock AFB is expected to receive an additional twelve C-130 aircraft, resulting in a corresponding increase in use of the airfield and existing airspace. As discussed in the noise analysis presented in Section 4.6, higher noise levels result both on-base and off-base under the Proposed Action, however increases are relatively minimal and no land uses are rendered incompatible. According to the noise analysis, noise levels remain well below any thresholds that would be expected to result in notable human annoyance, therefore no environmental justice impacts or special risks to children are anticipated due to aircraft noise.

4.8.2.2 Alternative Action

Under the Alternative Action, the Little Rock AFB population could increase from its current level of 13,466 persons to the project maximum sustainable population of 21,894 persons, an increase of 8,428 persons. This level of growth would represent an increase of 62.6 percent of the existing base population, 28.2 percent of the existing Jacksonville population of 29,916 persons, and 2.4 percent of the Pulaski County population. Movement of additional military personnel to Little Rock AFB to the identified maximum capability could result in a tightening of the housing market that could affect both housing supply and housing prices in Jacksonville and surrounding areas. In addition, the additional population could begin to stress community services such as schools, medical care, law enforcement, and others. Given that this expansion of personnel at Little Rock AFB would occur over many years, the stress on these systems would be spread out over a number of years and it is likely that upgrades to these services would occur in anticipation of this growth. Depending on growth capacity in the immediate area, a result of

the Alternative Action could be a greater dispersion of the induced population to more distant communities in Pulaski County.

As stated in the methodology section, construction activities associated with facility modifications under the Alternative Action would generate a number of jobs during the construction period, and contribute to local earnings and induced spending. Given the maximum developable acreage at the base, construction activity could be three times that projected to occur under the Proposed Action. Depending on the magnitude and duration of construction, a tightening of the labor market could occur; however, because construction would occur over several years, this would be expected to be minor. Impacts associated with construction would be temporary, only occurring for the duration of the construction period. No permanent or long-lasting socioeconomic impacts would be anticipated as a result of construction activity associated with the Alternative Action.

Under the Alternative Action, the Little Rock AFB population could increase from its current level of 13,466 persons to the project maximum sustainable population of 21,894 persons, an increase of 8,428 persons. This level of growth would represent an increase of 62.6 percent of the existing base population, 28.2 percent of the existing Jacksonville population of 29,916 persons, and 2.4 percent of the Pulaski County population. Movement of additional military personnel to Little Rock AFB to the maximum capacity could result in potentially significant impacts on the housing market and public services, particularly in the area immediately surrounding the base. The resulting tightening housing market could affect both housing supply and housing prices in Jacksonville. In addition, there could be potentially significant affects to community services such as schools, medical care, law enforcement, and others. Depending on growth capacity in the immediate area, a result of the Alternative Action may be a greater dispersion of the induced population to more distant communities in Pulaski County. Low-income households, in particular, may endure a disproportionate burden under these potential circumstances. Construction-related concerns under the Alternative Action would be similar to those described under the Proposed Action, and would be addressed in the same manner.

Under the Alternative Action, Little Rock AFB could accommodate an additional 39 C-130 aircraft, resulting in a corresponding increase in use of the airfield and existing airspace. As discussed in the noise analysis presented in Section 4.5, higher noise levels result both on-base and off-base under the Alternative Action. Projected increases are below levels that would be expected to create high annoyance to any major portion of the population overflown, and no land uses are rendered incompatible, therefore no environmental justice impacts or special risks to children would be anticipated due to aircraft noise.

4.8.2.3 No Action

Under the No Action Alternative, there would be no increase in personnel at Little Rock AFB, no increase in the number of aircraft assigned, and no facility modifications in support of the CIP. Population on base and in the ROI would not be affected. In addition, the construction-related employment and earnings impacts associated with the Proposed Action would not occur. No impacts to socioeconomic resources would occur under implementation of the No Action Alternative. No environmental justice impacts or special risks to children would occur under implementation of the No Action Alternative.

4.8.2.4 Cumulative Impacts

There are several other on-going and/or proposed activities in the ROI, as described in Section 2.7. The expected net result of these activities would be a minor short-term benefit to the local economy from construction-related purchases and a long term increase in economic activity as a result of an increase of population at Little Rock AFB. In general, these impacts would be expected to be minor

4.9 CULTURAL RESOURCES

4.9.1 METHODOLOGY

Cultural resources are subject to review under both Federal and state laws and regulations. Section 106 of the NHPA of 1966 empowers the ACHP to comment on federally initiated, licensed, or permitted projects affecting cultural sites listed or eligible for inclusion in the NRHP. Eligibility evaluation is the process by which resources are assessed relative to NRHP eligibility criteria. Those cultural resources determined to be eligible for the NRHP are protected under the NHPA.

Analysis of potential impacts to cultural resources considers both direct and indirect impacts. Direct impacts may occur by physically altering, damaging, or destroying all or part of a resource; altering characteristics of the surrounding environment that contribute to the resource's eligibility; introducing visual or audible elements that are out of character with the property or alter its setting; or neglecting the resource to the extent that it deteriorates or is destroyed. Direct impacts can be assessed by identifying the types and locations of proposed activities and determining the exact location of cultural resources that could be affected. Indirect impacts result primarily from the effects of project-induced population increases.

4.9.2 IMPACTS

4.9.2.1 Proposed Action

Implementation of the Proposed Action would, in general, have no direct or indirect effect on cultural resources. The base already hosts over 13,000 personnel and 85 aircraft, and the addition of fewer than 1,000 people and 12 aircraft would not result in any change in the conditions of cultural resources at Little Rock AFB that could be construed as direct or indirect effects. Similarly, the increase in night-time flying operations would not affect NRHP-listed or eligible resources that may be located in the vicinity of Little Rock AFB. Any such resources are currently subjected to aircraft overflight, and their NRHP eligibility has been determined within the existing noise and visual environment that includes those overflights.

No NRHP-listed or eligible archaeological resources would be impacted by the proposed CIP. Although two projects are in the vicinity of two historical archaeological sites, both sites are in poor condition and neither is considered eligible for listing on the NRHP (USAF 2005). In the unlikely event that archaeological resources are encountered during ground-disturbing activities, per Section 2.1 of AFI 32- 7065, *Cultural Resources Management*, work would stop at that location and the resources would be managed in compliance with Section 106 of the NHPA as described in the Little Rock Integrated Cultural Resources Management Plan (ICRMP) (USAF 2005).

There would be no effect to NRHP-eligible architectural resources as a result of renovation or demolitions projects. All buildings targeted for projects under the Proposed Action that are either over 50 years old or that date to the Cold War have been determined to be ineligible for the NRHP (USAF 2005).

There are no known federally-recognized Indian lands or resources at the location of the Proposed Action or on Little Rock AFB. The action is not considered to have "the potential to significantly affect Indian lands, treaty rights, or other tribal interests" as identified in DoD American Indian and Alaska Native Policy (1999). All tribes with the potential to have an interest in the action have been contacted (see Appendix A).

4.9.2.2 Alternative Action

Under the Alternative Action, indirect effects to cultural resources could occur as a result of reaching the maximum sustainable population, although such effects are unlikely. As the additional personnel recreate and train on the expanded base facilities, there is a small chance that they could encounter previously unrecorded archaeological sites and cause unintentional

adverse effects. Monitoring by the base natural and cultural resources manager would ensure Little Rock AFB complies with ICRMP and Section 106 if this situation arises.

Within the boundaries of Little Rock AFB, there is one NRHP-eligible architectural resource and 25 that have the potential to be considered eligible once they reach 50 years of age. These 25 buildings are slated to be reevaluated for potential NRHP-eligibility in 2012. Character-changing alterations to any of these buildings as a result of the maximum capability development alternative could directly and adversely impact their NRHP status. Any project proposed for the buildings listed in Table 3.9-1 must be coordinated with the base cultural resources manager and conducted in compliance with Section 106 of the NHPA.

It is unlikely that increased overflights at the level anticipated for this alternative would have more than a minor effect on NRHP listed or eligible historic properties outside the boundaries of Little Rock AFB. The visual and noise impacts as a result of this alternative would have to be at levels that adversely affected the property's qualities of significance such that it would no longer be considered eligible. This situation is highly unlikely, as any such properties are typically already overflown by air traffic from Little Rock AFB, and currently exist in an urban environment.

Potential direct impacts could arise from development of previously undisturbed areas that are sensitive for the presence of cultural resources. Based on the level of disturbance at Little Rock AFB, and location of parcels defined as vacant and developable, it is unlikely that the maximum development would impact NRHP-eligible cultural resources. However, ground disturbing activities, including development, have the potential to locate and impact previously unknown archaeological sites. Areas sensitive for the presence of archaeological sites have been identified at the west end of the runway, along undisturbed reaches of Cypress Branch, along other small drainages in the southeastern, southwestern and east central portions of the base, and along Rocky Creek (USAF 2005). The USAF will follow the procedures outlined in the Little Rock AFB ICRMP in planning projects in previously undisturbed locations, possibly including consultation with the SHPO, and will comply with AFI 32-7065 and NHPA.

4.9.2.3 No Action Alternative

No impacts to cultural resources are expected under the No Action Alternative. The resources would continue to be managed in compliance with federal law and USAF regulation. Cultural resources would remain as described in Section 3.9.1.

4.9.2.4 Cumulative Impacts

As described in Section 2.7, there are several other activities either currently underway, or planned over the short-term within the ROI. All known resources (whether eligible or not) will be avoided to the extent possible. In the unlikely event that archaeological resources were encountered during earthmoving associated with any of these activities that will occur on Little Rock AFB, per Section 2.1 of AFI 32-7065, *Cultural Resources Management*, work would stop at that location and the resources would be managed in compliance with Section 106 of the NHPA. Cumulative impacts to cultural resources are not expected.

4.10 SAFETY

Numerous federal, civil, and military laws and regulations govern operations at Little Rock AFB. Individually and collectively they prescribe measures, processes, and procedures required to ensure safe operations and to protect the public, military, and property.

4.10.1 METHODOLOGY

For each alternative action, the elements of the proposal that have a potential to affect safety are evaluated relative to the degree to which the action increases or decreases safety risks to aircrews, the public, and property. Ground, fire, and crash safety are assessed for the potential to increase risk, and the unit's capability to manage that risk by responding to emergencies. In considering explosive safety, projected changed uses and handling requirements are compared to current uses and practices. Analysis of flight risks correlates Class A mishap rates and BASH with projected airspace utilization associated with the action. When compared to similar data for current use of the airspace, assessments can be made of the magnitude of the safety impacts resulting from the change.

4.10.2 IMPACTS

4.10.2.1 Proposed Action

Under the Proposed Action, the unit's CIP would be implemented, as well as the recommendations of the 2005 BRAC Commission. Safety considerations associated with this alternative include construction of new facilities, alteration of existing facilities, and demolition of some facilities. Implementation of the BRAC recommendations would also result in an increase of up to 12 assigned C-130 aircraft with an associated increase in flying activities at Little Rock AFB, including an increase of 10 percent in night-time training.

The action would ensure new facilities for the 314 AW support operational requirements, and are properly sited with adequate space. Also, this would modernize supporting infrastructure and

would generally enhance ground, explosive, and flight safety. All projects conducted under the CIP would also incorporate AT/FP requirements to the maximum extent practicable, thus enhancing safety and security for the installation and associated personnel.

Activities involved in the proposed facility construction, modification, and demolition are not unique. Standard building and construction procedures and BMPs would be followed by the construction contractor(s).

Implementation of the Proposed Action would involve ground activities that may expose workers performing the required site preparation, grading, and building construction to some risk. The U.S. Department of Labor, Bureau of Labor Statistics maintains data analyzing fatal and non-fatal occupational injuries based on occupation. Due to the varying range of events classified as non-fatal injuries, the considerations described below focus on fatal injuries since they are the most catastrophic. Data are categorized as occurrences and incidence rates per 100,000 workers employed (on an annual average) in a specific occupation.

To assess relative risk associated with this proposal, it was assumed that the industrial classifications of workers involved are the Construction Trades. Based on U.S. Department of Labor data, in 2004 there were 5,117 worker-fatalities in the Private Industry Sector. Of these, 114 were employed in the non-residential and heavy construction trades. These fatalities constitute approximately 2 percent of all worker-fatalities. The incidence rate of all workers in the construction trades was 23.7 fatalities per 100,000 workers (U.S. Department of Labor 2006). Although DoD guidelines for assessing risk hazards would categorize the hazard category as "catastrophic" (because a fatality would be involved), the expected frequency of the occurrence would be considered "remote" (MIL-STD-882 1993). While the potential result must be considered undesirable, relative risk is low. Strict adherence to all applicable occupational safety requirements would further minimize the relatively low risk associated with these construction activities.

During facility demolition, all federal, state, and local regulations pertaining to processes and material disposition would be followed. If any hazardous materials are discovered, all hazardous waste would be managed and disposed of in accordance with all regulatory requirements.

There are no aspects of the Proposed Action that would create new or different explosive safety concerns. Adequate storage facilities currently exist, and they are sufficient to continue to support the 314 AW's mission.

Implementation of the BRAC Commission's recommendations would increase flying operations. Under the Proposed Action, it is estimated that annual C-130 sorties would increase from 21,651 to 25,115, an approximate 16 percent increase. Assuming an average sortie duration of one hour,

based on the C-130's Class A mishap rate of 0.90 per 100,000 flying hours this would result in a statistical prediction of a mishap occurring once every 4.4 years. However, to place this into context, relative risk remains at one chance out of more than 110,500; relative risk of a Class A mishap remains unchanged from current conditions.

Under normal current conditions, C-130s from the 314 AW are involved in a wildlife strikes and average of once every 528 sorties. With the increased flight operations, exposure to wildlife strikes would also increase. Under current operations, 314 AW C-130s experience an average of 41 strikes per year. Under the Proposed Action, statistically, this would be expected to increase to an average of 47 strikes per year. However, as discussed in Section 3.10.2, only a very small number of wildlife strikes have catastrophic consequences. The projected increase would not create major safety concerns.

4.10.2.2 Alternative Action

Under this alternative, the 314 AW would expand Little Rock AFB facilities to the maximum extent practicable, and increase the number of assigned C-130 aircraft by approximately 50 percent (a total of 124 aircraft). There would also be an increase of 10 percent in night time flight training.

Safety considerations associated with land development, facility construction, alteration, and demolition remain as described above. No major ground or explosive safety impacts would be expected to result from the implementation of this alternative.

Implementation of the Alternative Action would result in an increase of C-130 flying operations from 21,651 to 32,475 annual sorties, an approximate 50 percent increase. Assuming an average sortie duration of one hour, based on the C-130's Class A Mishap Rate of 0.90 per 100,000 flying hours, this would result in a statistical prediction of a mishap occurring once every 3.4 years. However, to place this into context, relative risk remains at one chance out of more than 110,500; relative risk remains unchanged from current conditions.

On average, under current conditions, C-130s from the 314 AW are involved in a wildlife strike every 528 sorties. With the increased flight operations, exposure to wildlife strikes would also increase. Under current operations, 314 AW C-130s experience an average of 41 strikes per year. Under the Maximum Capability Alternative, statistically, this would be expected to increase to an average of 61 per year. However, as discussed in Section 3.10, only a very small number of wildlife strikes have catastrophic consequences. The projected increase would not create major safety concerns.

4.10.2.3 No Action Alternative

Under the No Action Alternative, no facility construction, modification, or demolition would be accomplished. Also, no additional C-130 aircraft would be stationed at Little Rock AFB, and flight activities would remain as under current conditions.

4.10.2.4 Cumulative Impacts

There are a number of other on-going and/or proposed projects in the ROI, as described in Section 2.7. All these projects contain a short-term construction component in which a similar accident rate as described above would be expected. There is always a possibility of construction-related accidents; however, as described above, the probability of a very serious accident occurring is considered to be remote. The long-term effect of the several projects that are planned however would have the net effect of improving the overall safety of Little Rock AFB.

4.11 INFRASTRUCTURE

4.11.1 METHODOLOGY

LOS is the primary transportation and utility service issue. Criteria for evaluating impacts to transportation and utility services include potential for disruption and/or permanent degradation of the resource. The ROI for these resources encompasses Little Rock AFB and areas in the immediate vicinity of the installation.

4.11.2 IMPACTS

4.11.2.1 Proposed Action

Under the Proposed Action, there would be an increase of 600 full-time personnel, which in turn would increase the amount of vehicular traffic on base by 4.5 percent. Based on findings presented in Appendix B, it is anticipated that 73 percent of the new military personnel would live off base. This alternative would also include implementation of construction projects associated with the Little Rock AFB CIP, which includes development of over 715,000 SF of facilities. These actions would increase traffic volumes on the internal and external roadways associated with the base. The increase in traffic volume associated with the Proposed Action would result in more pressure on the roadway system and could affect the overall performance of the network. Assuming that the LOS at the intersections has not degraded since the completion of the most recent traffic study (Little Rock AFB 1996), the proposed increase in volume would have relatively little impact to the network. In general, the effects of increased volume are most evident at intersections and gates. The Little Rock AFB roadway intersections should operate at an acceptable LOS under this alternative. Based on the traffic engineering study (Little Rock

AFB 1996), the gate network should be able to accommodate the increased volume satisfactorily during low and medium security. The increase in volume could result in gates operating closer to capacity and thus could create some delays at each gate during higher security events. To determine a more accurate potential effect of the Proposed Action on traffic and circulation, an updated traffic study would be required.

Under the Proposed Action, the interior building space would be increased by 584,163 SF due to the CIP and would add 162 on-base and 438 off-base personnel due to BRAC related actions. The increase in building space represents an increase of 8 percent over the current value of approximately 6,960,000 SF. The 24-hour equivalent effective service population associated with the Proposed Action is 308, which is approximately 6 percent greater than the current effective population of 5,306. As further described in Appendix B, the 8 percent increase in building space is directly related to a similar increase in the demand for electrical and natural gas utilities serving those buildings and the 6 percent increase in effective population is directly related to the potable water and sewer system demand. The utility systems supporting potable water, sewer, electrical, and natural gas services are fully capable of supporting a 6 to 8 percent increase in demand (Appendix B). Localized temporary service disruptions may occur during construction of new facilities, but would be expected to be minor nuisances.

4.11.2.2 Alternative Action

Under the Alternative Action, there would be an increase of approximately 6,900 personnel, resulting in a projected base population of approximately 21,900. This action would also include an additional 3,000,000 SF of building space, with an accompanying 360 acres of pavements. Assuming that 73 percent of the military personnel would live off base and that each new person would result in an additional commuting trip, approximately 5,000 additional people would commute to Little Rock AFB. The additional commuting as a result of this action would degrade the internal roadway network on certain roadway segments and at the intersections throughout the base. Based on the results of the action, roadway improvements may need to implemented at high volume locations and signals may need to be installed where they are warranted. This action would also have an effect on the base's three gates. Assuming the current distribution of traffic through the gates would be maintained with the additional 5,000 people commuting and a 10 percent peak hour of average daily traffic adjustment factor, the anticipated gate counts would be as follows:

- Main Gate – 1,450 vehicles
- Back Gate – 618 vehicles
- School Gate – 180 vehicles

Based on these counts, there would need to be an extra lane added to the main gate to adequately handle the increase in traffic. To determine a more accurate potential effect of the alternative action on traffic and circulation, an updated traffic study would be required.

The Alternative Action would increase the interior building space by approximately 3,000,000 SF and would add approximately 13,422 in 24-hour equivalent effective service population, representing a total population increase of 21,894. The increase in building space represents an increase of 43 percent over the current value of approximately 6,960,000 SF. The 24-hour equivalent effective service population is roughly 2.5 times greater than the current effective population of 5,306. As further described in Appendix B, the existing utilities can manage anticipated demands associated with the Alternative Action.

Localized temporary service disruptions may occur during construction of new facilities, but would be expected to be only minor nuisances.

4.11.2.3 No Action Alternative

No impacts would be anticipated to transportation or utilities under the No Action Alternative. Conditions would continue as described in Section 3.11.2.

4.11.2.4 Cumulative Impacts

There are other on-going and/or proposed activities at in the ROI, as described in Section 2.7. The net result of these activities could be a minor short-term disruption in terms of transportation and circulation around the base and off-base, given that construction activities could temporarily alter traffic flow, particularly on Little Rock AFB. Long-term impacts should result in improved transportation and circulation throughout the ROI, because all on-going and/or proposed projects would be coordinated with the updated Base Master Plan and would be designed to improve overall flow throughout the installation. Off-base projects include roadway improvements that will also act to improve circulation. There could be a similar brief disruption to utility services over the short-term, but long-term impacts would be expected to be similarly positive.

4.12 SOLID AND HAZARDOUS MATERIALS AND WASTE

This section addresses the potential impacts caused by hazardous materials and waste management practices and the impacts of existing contaminated sites on reuse options. Hazardous materials and petroleum products, hazardous and petroleum wastes, IRP sites, and solid wastes will be discussed in this section.

4.12.1 METHODOLOGY

The qualitative and quantitative assessment of impacts from hazardous materials and solid waste management focuses on how and to what degree the alternatives affect hazardous materials usage and management, hazardous waste generation and management, and waste disposal. A substantial increase in the quantity or toxicity of hazardous substances used or generated would be considered potentially significant. Significant impacts could result if a substantial increase in human health risk or environmental exposure was generated at a level that cannot be mitigated to acceptable standards.

Regulatory standards and guidelines have been applied in evaluating the potential impacts that may be caused by hazardous materials and wastes. The following criteria were used to identify potential impacts:

- A spill or release of a reportable quantity of a hazardous substance as defined by the USEPA in 40 CFR Part 302.
- Manufacturing, use, or storage of a compound that requires notifying the pertinent regulatory agency according to EPCRA.
- Exposure of the environment or public to any hazardous material and/or waste through release or disposal practices.

4.12.2 IMPACTS

4.12.2.1 Proposed Action

Hazardous Materials and Petroleum Products

Increasing the C-130 fleet by up to 12 aircraft (from 75 PAI to 87 PAI) would increase the flying hours and, proportionally, the volume of jet fuel used (up to 16 percent). In addition, the increase in flying hours would increase aircraft maintenance hours and, proportionally, the volume of maintenance fluids (e.g., grease, oil, lubricants, and solvents) used. These additional hazardous materials and petroleum products would be managed in accordance with the existing protocols.

The Proposed Action also involves construction of buildings which would use substantial amounts of hazardous materials and petroleum products. These buildings include the C-130J Battery Shop, HAZMART Complex, Vehicle Wash Rack, C-130J Corrosion Control Hangar, and C-130 Maintenance Facility. These new buildings would be designed to contain all spills of hazardous materials and petroleum products or direct releases.

Hazardous and Petroleum Wastes

Increasing the C-130 fleet by up to 12 aircraft (from 75 PAI to 87 PAI) would increase the flying hours and, proportionally, the maintenance hours. This would increase the volume of hazardous and petroleum wastes generated by up to 16 percent. However, Little Rock AFB is already a large-quantity generator of hazardous waste and this additional volume would not affect its status.

The Proposed Action also involves construction of buildings which would generate hazardous and petroleum wastes. These buildings include the Vehicle Wash Rack, C-130J Corrosion Control Hangar, and C-130 Maintenance Facility. These new buildings would be designed to contain all spills of hazardous and petroleum wastes.

Installation Restoration Program Sites

Construction and demolitions activities would be conducted in proximity to the IRP sites and AOCs. Even though most of these sites have received No Further Action approval from the ADEQ, residual contamination may still be present. If visibly-contaminated soils are encountered during excavation activities (e.g., foundation work), work would stop until the soils are characterized and managed in accordance with the ADEQ regulations.

Solid Waste

The demolition of the buildings identified in Table 2.4-2 would generate construction debris over a short period of time (i.e., approximately 5,000 cubic yards of debris). In addition, based on the age of the buildings (i.e., 1950s), asbestos and lead-based paint may be present. All renovation projects are regulated and any asbestos or lead-based paint would be managed and abated in accordance with ADEQ regulations. In addition, all solid waste would be disposed of in accordance with applicable federal, state, and USAF regulations. Based on the available capacity of the Two Pines Landfill, the landfill has sufficient capacity to dispose of the construction debris.

4.12.2.2 Alternative Action

Under this alternative, the existing facilities and flying operations would be utilized to the maximum sustainable levels. An increase of 39 additional C-130s would increase the total number of aircraft by approximately 50 percent (from 75 PAI to 114 PAI). This would cause an increase in the number of flying hours and a proportional increase in the amount of jet fuel used, maintenance fluids used, and hazardous and petroleum wastes generated. These volumes would

be managed in accordance with the current protocols, and would be expected to result in only minor impacts.

4.12.2.3 No Action Alternative

Under this alternative, there would be no change to the current operations of Little Rock AFB. Therefore, conditions within the ROI would continue as described in Section 3.12.2.

4.12.2.4 Cumulative Impacts

There are several other on-going and/or planned projects in the ROI, as described in Section 2.7. While ground-disturbing activities always present the potential for disturbance of previously contaminated soil, there are no known IRP sites involved in any of the planned construction sites. Should contaminated soil be encountered during these activities, the soil would be tested and properly treated in accordance with applicable laws and regulations. Demolition activities associated with the planned projects could encounter asbestos-containing material and/or lead paint. These materials would be managed in compliance with applicable laws and USAF regulations. Cumulative impacts associated with these projects are expected to be minor.

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APPENDIX A
INTERAGENCY AND INTERGOVERNMENTAL COORDINATION FOR ENVIRONMENTAL PLANNING (IICEP)

INTERAGENCY, INTERGOVERNMENTAL COORDINATION FOR ENVIRONMENTAL PLANNING (IICEP)
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Phone: (501) 682-1611
Fax: (501) 682-3991
http://www.state.ar.us/aswcc/

State of Arkansas Department of Environmental Quality
Marcus C. Devine, Director
8001 National Drive
Little Rock, AR 72209
Phone: (501) 682-0744
http://www.adeq.state.ar.us/

Natural Resources Conservation Service
State Conservationist's Office
Room 3416 Federal Bldg 700 W. Capitol Ave.
Little Rock, AR 72201-3225
Phone: (501) 301 3100
Fax: (501) 301 3194
http://www.ar.nrcs.usda.gov/

Arkansas Geological Commission
William V. Bush, Director and State Geologist
Vardelle Parham Geology Center
3815 West Roosevelt Road
Little Rock, AR 72204
Phone: (501) 296-1877
Fax: (501) 663-7360
http://www.state.ar.us/agc/agc.htm

Arkansas State Historic Preservation Office
1500 Tower Building,
323 Center Street
Little Rock, AR 72201
Phone: (501) 324-9880
Fax: (501) 324-9184
info@arkansaspreservation.org

U.S. Army Corps of Engineers
Little Rock District
Planning, Environmental and Regulatory Division
700 W. Capitol Avenue, P.O. Box 867
Little Rock, AR 72203-0867
Phone: (501) 324-5295
Fax: (501) 324-6013
http://www.swl.usace.army.mil/index.html

Arkansas Game & Fish Commission
AGFC Headquarters
2 Natural Resources Drive
Little Rock, AR 72205
Phone: (501) 223-6300
http://www.agfc.state.ar.us/

Arkansas State Plant Board
1 Natural Resource Drive
Little Rock, AR 72205
http://www.plantboard.org/

Arkansas Department of Parks and Tourism
One Capitol Mall
Little Rock, AR 72201
Phone: (501) 682-7777
http://arkansasstateparks.com/

Metroplan
501 W. Markham St., Suite B
Little Rock, AR 72201
Phone: (501) 372-3300
Fax: (501) 372-8060
http://www.metroplan.org/

Jim Lawson - Director
Department of Planning and Development
723 West Markham
Little Rock, AR 72201
Phone: (501) 371-4790
Fax: (501) 371-6863
http://www.accesslittlerock.org/departments/planning_development_p1.html

Pulaski County, Arkansas
Planning and Development
501 S. Broadway, Suite A
Little Rock, AR 72201
Phone: (501) 340-8260
http://www.co.pulaski.ar.us/d3100p01.htm \

Arkansas Department of Finance and Administration
Office of Intergovernmental Services
State Clearinghouse Section
Room 412, 1515 Building
1515 West Seventh Street
Little Rock, Arkansas 72201
P. 0. Box 3278
Little Rock, Arkansas 72203
Manager: Tracy Copeland
E-mail - tracy.copeland@dfa.state.ar.us
Phone (501) 682-1074
FAX (501) 682-5206

The Department of Arkansas Heritage
1500 Tower Building
323 Center Street
Little Rock, Arkansas 722201
Phone (501) 324-9150
http://www.arkansasheritage.com/

Quapaw Tribe of Oklahoma
Tamara Martin, Chairman
P.O. Box 765
Quapaw, OK 74363
Phone: (918) 542-1853
Fax: (918) 542-4694
E-mail: quapaw@eighttribes.org
http://www.geocities.com/Athens/Aegean/1388/

DEPARTMENT OF THE ARMY
LITTLE ROCK DISTRICT CORPS OF ENGINEERS
POST OFFICE BOX 867
LITTLE ROCK, ARKANSAS 72203-0867

August 30, 2006

Planning and Environmental Office

Ms. Kate L. Bartz
Science Applications
International Corporation (SAIC)
2617 East 7th Street
Tucson, Arizona 85716

Dear Ms. Bartz:

The Planning & Environmental Office of the Little Rock District, U.S. Army Corps of Engineers has reviewed the draft environmental assessment (DEA) for a proposal to implement installation development at Little Rock, AFB. The document appears to be well written and comprehensive relative to the proposed action. We have no specific comments to add at this time.

If conditions change regarding this project, prior to construction final detailed plans and information should be sent to the following address to determine the need for any Section 404 permits under the Clean Water Act: **Mr. Jerry Harris, Chief, Regulatory Office, Little Rock District, U.S. Army Corps of Engineers, P.O. 867, Little Rock, AR 72203.**

Thank you for allowing us to review this DEA. If you have any questions, please call me at 501-324-5629.

Sincerely,

Jim Ellis
NEPA Specialist

cc: Ron Love, Chief Environmental Programs & Analysis, 314 Civil Engineer Squadron, 314 CES/CEVA, 528 Thomas Avenue, Little Rock AFB, AR 72099-4987

United States Department of Agriculture

NRCS

Natural Resources Conservation Service
Room 3416, Federal Building
700 West Capitol Avenue
Little Rock, Arkansas 72201-3225

SEP 1 5 2006

Ms Kate L. Bartz
Science Applications International Corporation
2617 East 7th Street
Tucson, Arizona 85716

Dear Ms Bartz:

This letter is in response to your request for comments on the Environmental Assessment for a proposal to implement installation development at Little Rock Air Force Base. The improvements to the installation will have no impact on Prime Farmlands of Farmland of Statewide Importance. Best Management Practices (BMP's) should be used in construction to limit the amount of erosion and sedimentation to local streams.

Should you have any questions or need additional information, please call me at (501) 301-3172.

Sincerely,

EDGAR P. MERSIOVSKY
Assistant State Soil Scientist

United States Department of the Interior

FISH AND WILDLIFE SERVICE
110 S. Amity Road, Suite 300
Conway, Arkansas 72032
Tel.: 501/513-4470 Fax: 501/513-4480

IN REPLY REFER TO:

September 20, 2006

Mr. Ron Love
c/o Ms. Kate L. Bartz
SAIC
2617 E. 7th St.
Tucson, AZ 85716

Dear Mr. Love:

The U.S. Fish and Wildlife Service (Service) has reviewed the Draft Environmental Assessment (DEA) for a proposal to implement installation development at Little Rock Air Force Base (LRAFB) in Jacksonville, Arkansas. Our comments and recommendations are submitted in accordance with the National Environmental Policy Act of 1969, Executive Order 12372, Endangered Species Act of 1973 (Public Law 93-205, as amended) and the Fish and Wildlife Coordination Act (Public Law 85-624; 16 U.S.C. 661-666e.).

The Service has reviewed your determination of June 27, 2006 regarding the finding and assessment of endangered Interior Least Tern (*Sterna antillarum athalassos*) feeding at LRAFB. Our comments and recommendations on that finding were submitted in a July 18, 2006 letter. After reviewing the information provided by your staff and after visiting the site and observing the Least Terns we recommended development of certain protocols to prevent disturbance and take. The proposed Roof Access Protocol includes our recommendations and provides appropriate guidance to protect any nesting birds from being disturbed or taken by ensuring that the maintenance staff is aware of their potential presence and instructing on what actions to take if they are encountered. Therefore, the Service concurred that the normal base operations are "not likely to adversely affect" the Interior Least Tern's activities and that any effects from normal operations subsequent to implementation of the aforementioned protocols are expected to be discountable or insignificant. Furthermore, the Service concurs that no threatened or endangered species in the vicinity of LRAFB are expected to be impacted by the proposed developments and no additional consultation regarding Section 7 of the Endangered Species Act is required at this time.

The Service has no objections or additional comments regarding this project. If you have any questions, please contact me at (501) 513-4489.

Sincerely,

Lindsey Lewis
Environmental Coordinator

ADEQ
ARKANSAS
Department of Environmental Quality

September 5, 2006

Ms. Kate L. Bartz
Science Applications International Corporation
2617 East 7th Street
Tucson, Arizona 85716

RE: Little Rock Air Force Base, Arkansas

Dear Ms. Bartz:

The Arkansas Department of Environmental Quality has reviewed the information submitted regarding a proposal to implement installation development at the referenced location. We have no comments at this time.

If you have any questions or concerns, please contact me at (501) 682-0947.

Sincerely,

Nathaniel P. Nehus
Chief Ecologist

ENVIRONMENTAL PRESERVATION AND TECHNICAL SERVICES DIVISION
8001 NATIONAL DRIVE / POST OFFICE BOX 8913 / LITTLE ROCK, ARKANSAS 72219-8913 / TELEPHONE 501-682-0937 / FAX 501-682-0936
www.adeq.state.ar.us

The Department of
Arkansas
Heritage

Mike Huckabee, Governor
Cathie Matthews, Director

Arkansas Arts Council
▪
Arkansas Natural Heritage Commission
▪
Delta Cultural Center
▪
Historic Arkansas Museum
▪
Mosaic Templars Cultural Center
▪
Old State House Museum

Arkansas Historic Preservation Program

1500 Tower Building
323 Center Street
Little Rock, AR 72201
(501) 324-9880
fax: (501) 324-9184
tdd: (501) 324-9811
e-mail: info@arkansaspreservation.org
website:
www.arkansaspreservation.org

An Equal Opportunity Employer

September 12, 2006

Mr. Ronald Love REM
Chief, Environmental Programs & Analysis
Headquarters 314th Airlift Wing (AETC)
528 Thomas Avenue
Little Rock Air Force Base, Arkansas 72099-4987

RE: Pulaski County - Jacksonville
Section 106 Review - USAF
Base Realignment and Closure Program; Little Rock Air Force Base
AHPP Tracking No: 60466

Dear Mr. Love:

This letter is written in response to your inquiry regarding properties of architectural, historical, or archeological significance in the area of the referenced project. My staff has reviewed the documentation regarding the above-referenced undertaking. Our records show that 37 archeological sites (3PU417, 3PU418, 3PU419, 3PU420, 3PU421, 3PU422, 3PU423, 3PU424, 3PU425, 3PU426, 3PU427, 3PU428, 3PU429, 3PU430, 3PU431, 3PU432, 3PU433, 3PU434, 3PU435, 3PU436, 3PU437, 3PU438, 3PU439, 3PU440, 3PU442, 3PU443, 3PU444, 3PU445, 3PU446, 3PU447, 3PU448, 3PU449, 3PU450, 3PU451, 3PU452 and 3PU456) and 21 historic structures (PU9803 - Bldg. 710, PU9804 - Bldg. 714, PU9805S - Titan II Silo 373-4 Memorial, PU9806 - Bldg. 147, PU9807 - Bldg. 148, PU9808 - Bldg. 149, PU9809 - Bldg. 150, PU9810 - Bldg. 210, PU9811 - Bldg. 214, PU9812 - Bldg. 310, PU9813 - Bldg. 314, PU9814 - Bldg.320, PU9815 - Bldg. 430, PU9816 - Bldg. 830, PU9817 - Bldg. 1704, PU9818 - Bldg.1714, PU9819 - Bldg. 1776, PU9820 - RR Spur Loading Station, PU9821 - Nose cone Training Site, PU9822 - 308th SMW Memorial and PU9823 - Total II Nose Cone) are located on Little Rock Air force Base.

Of these 58 properties, four are considered eligible for inclusion in the National Register of Historic Places (PU9815, PU9816, PU9819 and PU9821) while six are of undetermined eligibility (3PU417, 3PU418, 3PU422, 3PU444, 3PU450 and PU9823). The remaining 48 properties are not eligible for inclusion in the NRHP and require no further management. In addition, 24 more buildings could become eligible upon reaching the fifty year age criteria, as noted on page 3-47 of the draft EA. In fact, most of these (all but Buildings 258 and 1730) were constructed in 1955 and 1956 and, therefore, have reached fifty years in age.

Any future development that may have an effect on properties considered eligible or that are of undetermined eligibility should be submitted to this office for review under Section 106. In addition, areas of the base that have not been surveyed for cultural resources previously and that will be subjected to ground disturbing activity should be surveyed and a report that meets the 1994 standards contained in Appendix B of "A State Plan for the Conservation of Archeological Resources in Arkansas" should be submitted to this office for review prior to project implementation.

Thank you for the opportunity to comment on this undertaking. If you have any questions, please contact Steve Imhoff of my staff at (501) 324-9880.

Sincerely,

Ken Grunewald
Deputy State Historic Preservation Officer

cc: Ms. Kate L. Bartz, Science Applications International Corp.
Dr. Ann M. Early, Arkansas Archeological Survey
Mr. Jim Roan Gray, Osage Nation
Ms. Carrie V. Wilson, Quapaw Tribe of Oklahoma

Arkansas Natural Resources Commission

J. Randy Young, P.E.
Executive Director

101 East Capitol Avenue, Suite 350
Little Rock, Arkansas 72201
http://www.aswcc.arkansas.gov/

Phone: (501) 682-1611
Fax: (501) 682-3991
E-mail: anrc@arkansas.gov

Mike Huckabee
Governor

August 29, 2006

Ms. Kate L. Bartz
Science Applications International Corporation
2617 East 7th Street
Tucson, Arizona 85716

Re: Draft Environmental Assessment (EA) and Draft Finding of No Significant Impact (FONSI) for a Proposal to Implement Installation Development
Little Rock Air Force Base (AFB), Arkansas

Dear Ms. Bartz:

Thank you for the opportunity to comment on the Draft EA and Draft FONSI regarding the proposal to implement the requirements of the Base Realignment and Closure (BRAC) program as it relates to Little Rock AFB, as well as other installation development based on the current Capital Improvements Program (CIP). Components of the BRAC program at Little Rock AFB include the increase of the on-Base population by up to 600 full-time military personnel, the C-130 fleet by up to twelve aircraft, and the increase of night-time flying operations by 10 percent. The components of the CIP would include new building construction and alteration, replacement of old buildings, and demolition of some existing facilities. The purpose of this action is to upgrade, replace, or supplement facilities that have been in place over several years and are no longer efficient or adequate to serve their original intended functions. There is one action alternative presented, which establishes and evaluates a potential development capability of Little Rock AFB. This alternative includes development of Little Rock AFB facilities to the maximum capability of the installation; increase in the number of assigned personnel to the base's potential capability; and conduct of flying operations at maximum sustainable levels.

My staff has reviewed the Draft EA, and concurs with the findings presented in the Draft FONSI. I recommend the project move forward with the proposed action.

If you have any questions or need further assistance, please contact Kenneth Colbert of my staff at 501-682-1608. Again, thank you for the opportunity to review and comment on the Draft EA and Draft FONSI regarding the proposal to implement installation development.

Sincerely,

J. Randy Young, P.E.
Executive Director

JRY/kc

STATE OF ARKANSAS
Department of Finance and Administration

OFFICE OF INTERGOVERNMENTAL SERVICES
1515 West Seventh Street, Suite 417
Post Office Box 8031
Little Rock, Arkansas 72203-8031
Phone: (501) 682-1074
Fax: (501) 682-5206
http://www.state.ar.us/dfa

September 12, 1006

Ms. Kate L. Bartz
Science Applications International Corportation
2617 East 7th Street
Tucson, AZ 85716

RE: Draft Environmental Assessment For Installation Development at Little Rock Air Force Base, Little Rock, Arkansas

Dear Ms. Bartz:

The State Clearinghouse has received the above document pursuant to the Arkansas Project Notification and Review System.

To carry out the review and comment process, this document was forwarded to members of the Arkansas Technical Review Committee. Resulting comments received from the Technical Review Committee which represents the position of the State of Arkansas are attached.

The State Clearinghouse wishes to thank you for your cooperation with the Arkansas Project Notification and Review System.

Sincerely,

Tracy L. Copeland, Manager
State Clearinghouse

TLC/th
Enclosure
CC: Randy Young, ANRC

Arkansas Natural Resources Commission

J. Randy Young, PE
Executive Director

101 East Capitol, Suite 350
Little Rock, Arkansas 72201
http://www.anrc.arkansas.gov/

Phone: (501) 682-1611
Fax: (501) 682-3991
E-mail: anrc@arkansas.gov

Mike Huckabee
Governor

MEMORANDUM

RECEIVED
SEP 12 2006
INTERGOVERNMENTAL SERVICES
STATE CLEARINGHOUSE

TO: Mr. Tracy Copeland, Manager
State Clearinghouse

FROM: Mr. J. Randy Young, P.E., Chairman
Technical Review Committee

SUBJECT: Draft Environmental Assessment For Installation Development at Little Rock Air Force Base, Little Rock, Arkansas

DATE: September 11, 2006

Members of the Technical Review Committee have reviewed the above referenced project; an environmental assessment for a proposal to implement installation development at the Little Rock Air Force Base. Little Rock Air Force Base is the home of the 314th Airlift Wing and is the only C-130 training base in the Department of Defense. The proposed action is necessary because there are currently shortfalls in availability of adequate facilities at the Base. The Proposed Action would provide the necessary facilities to efficiently accomplish the continuously evolving mission of the 314 Airlift Wing. The 314 AW trains C-130 aircrew members from all branches of the services and 27 allied nations. Tenant units located at the base include the 463rd Airlift Group, Mobility Weapons School under air Mobility Command, and the 189th Airlift Wing under the Air National Guard. The combined mission is to organize, equip, and train combat-ready airlift units to operated anywhere in the world.

The Committee supports this project. Agency comments are included for your review.

The opportunity to comment is appreciated.

JRY/ddavis

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09/12/2006 08:41 5016823991 AR NATURAL RESOURCES PAGE 01/23

STATE OF ARKANSAS

Department of Finance and Administration

OFFICE OF INTERGOVERNMENTAL SERVICES

1515 West Seventh Street, Suite 412
Post Office Box 8031
Little Rock, Arkansas 72203-8031
Phone: (501) 682-1074
Fax: (501) 682-5206
http://www.state.ar.us/dfa

MEMORANDUM

#1020

TO: All Technical Review Committee Members

FROM: Tracy L. Copeland, Manager - State Clearinghouse

DATE: August 24, 2006

SUBJECT: Draft Environmental Assessment for Installation Development at Little Rock AFB, Little Rock AFB, Arkansas.

Please review the above stated document under provisions of Section 404 of the Clean Water Act, Section 102(2) of the National Environmental Policy Act of 1969 and the Arkansas Project Notification and Review System.

Your comments should be returned by September 8, 2006 to - Mr. Randy Young, Chairman, Technical Review Committee, 101 E. Capitol, Suite 350, Little Rock, AR 72203.

If you have no reply within that time we will assume you have no comments and will proceed with the sign-off.

NOTE: It is Imperative that your response be in to the ASWCC office by the date requested. Should your Agency anticipate having a response which will be delayed beyond the stated deadline for comments, please contact Ms. Debby Davis of the ASWCC at (501) 682-1611 or the State Clearinghouse Office.

_____ Support

_____ Do Not Support (Comments Attached)

✓ Comments Attached

_____ Support with Following Conditions

_____ No Comments

_____ Non-Degradation Certification Issues (Applies to ADEQ Only)

Name(print) Colbert Agency ANRC Date 9-7-06

Telephone Number _____

8/24/2006

PAGE 02/23 AR NATURAL RESOURCES 5016823991 09/12/2006 08:41

Arkansas Natural Resources Commission

J. Randy Young, P.E.
Executive Director

101 East Capitol Avenue, Suite 350
Little Rock, Arkansas 72201
http://www.aswcc.arkansas.gov/

Phone: (501) 682-1611
Fax: (501) 682-3991
E-mail: anrc@arkansas.gov

Mike Huckabee
Governor

August 29, 2006

Ms. Kate L. Bartz
Science Applications International Corporation
2617 East 7th Street
Tucson, Arizona 85716

Re: Draft Environmental Assessment (EA) and Draft Finding of No Significant Impact (FONSI) for a Proposal to Implement Installation Development
Little Rock Air Force Base (AFB), Arkansas

Dear Ms. Bartz:

Thank you for the opportunity to comment on the Draft EA and Draft FONSI regarding the proposal to implement the requirements of the Base Realignment and Closure (BRAC) program as it relates to Little Rock AFB, as well as other installation development based on the current Capital Improvements Program (CIP). Components of the BRAC program at Little Rock AFB include the increase of the on-Base population by up to 600 full-time military personnel, the C-130 fleet by up to twelve aircraft, and the increase of night-time flying operations by 10 percent. The components of the CIP would include new building construction and alteration, replacement of old buildings, and demolition of some existing facilities. The purpose of this action is to upgrade, replace, or supplement facilities that have been in place over several years and are no longer efficient or adequate to serve their original intended functions. There is one action alternative presented, which establishes and evaluates a potential development capability of Little Rock AFB. This alternative includes development of Little Rock AFB facilities to the maximum capability of the installation; increase in the number of assigned personnel to the base's potential capability; and conduct of flying operations at maximum sustainable levels.

My staff has reviewed the Draft EA, and concurs with the findings presented in the Draft FONSI. I recommend the project move forward with the proposed action.

If you have any questions or need further assistance, please contact Kenneth Colbert of my staff at 501-682-1608. Again, thank you for the opportunity to review and comment on the Draft EA and Draft FONSI regarding the proposal to implement installation development.

Sincerely,

J. Randy Young, P.E.
Executive Director

JRY/kc

An Equal Opportunity Employer

PAGE 03/23 AR NATURAL RESOURCES 5016823991

STATE OF ARKANSAS

Department of Finance and Administration

OFFICE OF INTERGOVERNMENTAL SERVICES

1515 West Seventh Street, Suite 412
Post Office Box 8031
Little Rock, Arkansas 72203-8031
Phone: (501) 682-1074
Fax: (501) 682-5206
http://www.state.ar.us/dfa

MEMORANDUM

TO: All Technical Review Committee Members

FROM: Tracy L. Copeland, Manager - State Clearinghouse

DATE: August 24, 2006

SUBJECT: Draft Environmental Assessment for Installation Development at Little Rock AFB, Little Rock AFB, Arkansas.

Please review the above stated document under provisions of Section 404 of the Clean Water Act, Section 102(2) of the National Environmental Policy Act of 1969 and the Arkansas Project Notification and Review System.

Your comments should be returned by September 8, 2006 to - Mr. Randy Young, Chairman, Technical Review Committee, 101 E. Capitol, Suite 350, Little Rock, AR 72203.

If you have no reply within that time we will assume you have no comments and will proceed with the sign-off.

NOTE: It is Imperative that your response be in to the ASWCC office by the date requested. Should your Agency anticipate having a response which will be delayed beyond the stated deadline for comments, please contact Ms. Debby Davis of the ASWCC at (501) 682-1611 or the State Clearinghouse Office.

✓ Support

✓ Comments Attached

____ No Comments

____ Do Not Support (Comments Attached)

____ Support with Following Conditions

____ Non-Degradation Certification Issues (Applies to ADEQ Only)

Name(print) William Prior Agency A.G.C. Date 8-28-2006

Telephone Number 501-683-0117

09/12/2006 00:41 5015823991 AR NATURAL RESOURCES PAGE 04/23

Arkansas GEOLOGICAL COMMISSION

VARDELLE PARHAM GEOLOGY CENTER • 3815 WEST ROOSEVELT ROAD • LITTLE ROCK, ARKANSAS 72204

Mike Huckabee
Governor
Bekki White
Director and State Geologist

August 28, 2006

Mr. Randy Young
Chairman, Technical review Committee
101 E. Capitol, Suite 350
Little Rock, Arkansas 72203

Dear Mr. Young:

Please see the attached letter dated May 15, 2005 to a Ms. Kate Bartz concerning comments to proposed improvements to the Little Rock Air Force Base at Jacksonville, Arkansas.

Sincerely

William Lee Prior

William Lee Prior
Geologist Supervisor

PHONE: (501) 296-1877; FAX: (501) 663-7360
agc@arkansas.gov
www.state.ar.us/agc/agc.htm
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PAGE 05/23 AR NATURAL RESOURCES

STATE OF ARKANSAS

Department of Finance and Administration

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1515 West Seventh Street, Suite 412
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Little Rock, Arkansas 72203-8031
Phone: (501) 682-1074
Fax: (501) 682-5206
http://www.state.ar.us/dfa

MEMORANDUM

TO: All Technical Review Committee Members

FROM: Tracy L. Copeland, Manager - State Clearinghouse

DATE: August 24, 2006

SUBJECT: Draft Environmental Assessment for Installation Development at Little Rock AFB, Little Rock AFB, Arkansas.

Please review the above stated document under provisions of Section 404 of the Clean Water Act, Section 102(2) of the National Environmental Policy Act of 1969 and the Arkansas Project Notification and Review System.

Your comments should be returned by September 8, 2006 to - Mr. Randy Young, Chairman, Technical Review Committee, 101 E. Capitol, Suite 350, Little Rock, AR 72203.

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_____ Support

_____ Comments Attached

_X_ No Comments

_____ Do Not Support (Comments Attached)

_____ Support with Following Conditions

_____ Non-Degradation Certification Issues (Applies to ADEQ Only)

Name(print) HAROLD SEIFERT Agency _____ Date 08-24-06

Telephone Number 501-661-2623

ENGINEERING SECTION
DIVISION OF HEALTH - SLOT H37
AR DEPT. OF HEALTH & HUMAN SERVICES
P.O. BOX 1437
LITTLE ROCK, AR 72203-1437

STATE OF ARKANSAS

Department of Finance and Administration

OFFICE OF INTERGOVERNMENTAL SERVICES

1515 West Seventh Street, Suite 412
Post Office Box 8031
Little Rock, Arkansas 72203-8031
Phone: (501) 682-1074
Fax: (501) 682-5206
http://www.state.ar.us/dfa

MEMORANDUM

TO: All Technical Review Committee Members

FROM: Tracy L. Copeland, Manager - State Clearinghouse

DATE: August 24, 2006

SUBJECT: Draft Environmental Assessment for Installation Development at Little Rock AFB, Little Rock AFB, Arkansas.

Please review the above stated document under provisions of Section 404 of the Clean Water Act, Section 102(2) of the National Environmental Policy Act of 1969 and the Arkansas Project Notification and Review System.

Your comments should be returned by September 8, 2006 to - Mr. Randy Young, Chairman, Technical Review Committee, 101 E. Capitol, Suite 350, Little Rock, AR 72203.

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✓ Support

_____ Do Not Support (Comments Attached)

_____ Comments Attached

_____ Support with Following Conditions

_____ No Comments

_____ Non-Degradation Certification Issues (Applies to ADEQ Only)

Name(print) George Rainbolt Agency AFC Date 8-25-06

Telephone Number 296-1861

09/12/2006 00:41 5016823991 AR NATURAL RESOURCES PAGE 07/23

STATE OF ARKANSAS

Department of Finance and Administration

OFFICE OF INTERGOVERNMENTAL SERVICES

1515 West Seventh Street, Suite 412
Post Office Box 8031
Little Rock, Arkansas 72203-8031
Phone: (501) 682-1074
Fax: (501) 682-5206
http://www.state.ar.us/dfa

MEMORANDUM

TO: All Technical Review Committee Members

FROM: Tracy L. Copeland, Manager - State Clearinghouse

DATE: August 24, 2006

SUBJECT: Draft Environmental Assessment for Installation Development at Little Rock AFB, Little Rock AFB, Arkansas.

Please review the above stated document under provisions of Section 404 of the Clean Water Act, Section 102(2) of the National Environmental Policy Act of 1969 and the Arkansas Project Notification and Review System.

Your comments should be returned by September 8, 2006 to - Mr. Randy Young, Chairman, Technical Review Committee, 101 E. Capitol, Suite 350, Little Rock, AR 72203.

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_____ Support

_____ Do Not Support (Comments Attached)

_X_ Comments ~~Attached~~ Below

_____ Support with Following Conditions

_____ No Comments

_____ Non-Degradation Certification Issues (Applies to ADEQ Only)

Projects involving construction must comply w/ NPDES Stormwater Program

Name(print) Keith Brown Agency ADEQ Date 8-25-06

Telephone Number 682-0653

PAGE 08/23

AR NATURAL RESOURCES

5016823991

STATE OF ARKANSAS

Department of Finance and Administration

OFFICE OF INTERGOVERNMENTAL SERVICES

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Post Office Box 8031
Little Rock, Arkansas 72203-8031
Phone: (501) 682-1074
Fax: (501) 682-5206
http://www.state.ar.us/dfa

MEMORANDUM

RECEIVED
AUG 28 2006

TO: All Technical Review Committee Members

FROM: Tracy L. Copeland, Manager - State Clearinghouse

DATE: August 24, 2006

SUBJECT: Draft Environmental Assessment for Installation Development at Little Rock AFB, Little Rock AFB, Arkansas.

Please review the above stated document under provisions of Section 404 of the Clean Water Act, Section 102(2) of the National Environmental Policy Act of 1969 and the Arkansas Project Notification and Review System.

Your comments should be returned by September 8, 2006 to - Mr. Randy Young, Chairman, Technical Review Committee, 101 E. Capitol, Suite 350, Little Rock, AR 72203.

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_____ Support

_____ Comments Attached

__X__ No Comments

_____ Do Not Support (Comments Attached)

_____ Support with Following Conditions

_____ Non-Degradation Certification Issues (Applies to ADEQ Only)

Name(print) Keith Brown Agency ADEQ Date 8-29-06

Telephone Number ADEQ

09/12/2006 00:41 5016823991 AR NATURAL RESOURCES PAGE 09/23

Bob
Lu

STATE OF ARKANSAS

Department of Finance and Administration

OFFICE OF INTERGOVERNMENTAL SERVICES

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MEMORANDUM

Received
AUG 25 2006
River Basins

TO: All Technical Review Committee Members

FROM: Tracy L. Copeland, Manager - State Clearinghouse

DATE: August 24, 2006

SUBJECT: Draft Environmental Assessment for Installation Development at Little Rock AFB, Little Rock AFB, Arkansas.

Please review the above stated document under provisions of Section 404 of the Clean Water Act, Section 102(2) of the National Environmental Policy Act of 1969 and the Arkansas Project Notification and Review System.

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_____ Support

_____ Comments Attached

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Name(print) Robert K. Lennard Agency AGFC Date 8-31-06

Telephone Number 977-7301

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Department of Finance and Administration

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http://www.state.ar.us/dfa

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2006 AUG 28 PM 11:26
ARKANSAS DEPT. OF HEALTH
DIVISION OF ENGINEERING

MEMORANDUM

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DATE: August 24, 2006

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_____ Support	_____ Do Not Support (Comments Attached)
_____ Comments Attached	_____ Support with Following Conditions
_X_ No Comments	_____ Non-Degradation Certification Issues (Applies to ADEQ Only)

Name(print) Harold Seifert Agency ENGINEERING SECTION Date 08-29-06

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Noele Douthitt

From: Jerry Bradshaw [jbradshaw@cosl.org]

Sent: Thursday, August 24, 2006 4:04 PM

To: noele.douthitt@dfa.state.ar.us

Subject: Draft Environmental Assessment for Installation Development at Little Rock AFB, Little Rock AFB, AR

The Commissioner of State Lands Office Supports this project and has no comments.

Jerry Bradshaw
Mineral Leasing Officer
Commissioner of State Lands Office
109 State Capitol Building
Little Rock, AR 72116
501/683-3310
jbradshaw@cosl.org

STATE OF ARKANSAS

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MEMORANDUM

RECEIVED
AHTD
AUG 25 2006
ENVIRONMENTAL
DIVISION

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DATE: August 24, 2006

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_____Support _____ Do Not Support (Comments Attached)

_____Comments Attached _____ Support with Following Conditions

__✓__ No Comments _____ Non-Degradation Certification Issues (Applies to ADEQ Only)

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STATE CLEARINGHOUSE

Name(print) John L. Harris Agency AHTD Date 8/25/06

Telephone Number (501) 569-2281

APPENDIX B
CAPABILITY ANALYSIS

FINAL



Capability Analysis for Little Rock Air Force Base, Arkansas

Department of the Air Force
Air Education and Training Command

10 July 2006

FINAL

ACRONYMS AND ABBREVIATIONS

22 STS	22d Special Tactics Squadron
48 AS	48th Airlift Squadron
53 AS	53d Airlift Squadron
62 AS	62d Airlift Squadron
189 AW	189th Airlift Wing
314 AW	314th Airlift Wing
314 CES/CEOE	314th Civil Engineering Squadron Maintenance Engineering
314 CES/CEV	314th Civil Engineer Environmental Flight
314 OSS	314th Operations Support Squadron
463 AG	463d Airlift Group
AADZ	All-American Drop Zone
AALZ	All-American Landing Zone
ADSL	Average Daily Student Load
AETC	Air Education and Training Command
AFB	Air Force Base
AGL	above ground level
AMC	Air Mobility Command
ARTCC	Air Route Traffic Control Center
ATC	Air Traffic Control
AZ	Assault Zone
BJDZ	Black Jack Drop Zone
C4	Command, Control, Communications, and Computer Systems
CFH	cubic feet per hour
CIP	Capital Improvements Program
dB	decibel
dBA	A-weighted decibel
DoD	Department of Defense
DZ	Drop Zone
EA	Environmental Assessment
EP	effective population
FAA	Federal Aviation Administration
FY	Fiscal Year
gpm	gallons per minute
HAHO	High Altitude - High Opening
HALO	High Altitude - Low Opening
Hz	Hertz
I&I	infiltration and inflow
IFR	Instrument Flight Rule
IMC	Instrument Meteorological Conditions
Jax DZ	Jacksonville Drop Zone
JWW	Jacksonville Water Works
JWWU	Jacksonville Waste Water Utility
kV	kilovolt
KWH	kilowatt-hour
L_{dn}	Day-Night Average Sound Level
L_{dnmr}	Onset-Rate Adjusted Monthly Day-Night Average Sound Level
LIT	Little Rock Approach Control
LRF	Little Rock AFB Control Tower
LZ	Landing Zone
MCF	million cubic feet
MFH	Military Family Housing
MG	million gallons
MGD	million gallons per day
MSL	mean sea level
MTR	military training route
MW	megawatt
NAF	non-appropriated fund
NM	nautical mile
NOTAM	Notice to Airmen
PSIG	pounds per square inch (gauge)
PVC	polyvinyl chloride
SCF	standard cubic feet
SCFx10^6	million standard cubic feet
SCFH	standard cubic feet per hour
SF	square feet
SR	Slow Speed Low Altitude Training Route
TOT	Time-on-Target
U.S.	United States
USAF	United States Air Force
USEPA	United States Environmental Protection Agency
VFR	Visual Flight Rule
VMC	Visual Meteorological Conditions
VORTAC	very high frequency omni-directional range/tactical air navigation
ZME	Memphis Air Route Traffic Control Center

FINAL

Capability Analysis
for
Little Rock Air Force Base, Arkansas

Department of the Air Force
Air Education and Training Command

FINAL

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FINAL

EXECUTIVE SUMMARY

The purpose of this Capability Analysis is to estimate the maximum development potential for Little Rock Air Force Base (AFB), considering any limiting factors. The primary objective is to determine sustainable non-flying and flying mission growth potential through the 5-year planning period ending in the year 2011. The parameters evaluated in this Capability Analysis were analyzed to only that level of detail required to determine a general capacity for growth. The growth potential identified in this Capability Analysis will be used to define a potential development alternative to be assessed in the Installation Development Environmental Assessment.

The Capability Analysis is presented in three major sections: the Non-flying Mission; Constraints Analysis; and the Flying Mission. This Capability Analysis provides information on development potential at Little Rock AFB in support of potential mission expansion. This Capability Analysis considers the net acreage available for physical development in each land use category (generally excluding parcels smaller than 3 acres) that is free of any physical and/or operational constraints (i.e., safety easements, wetlands, floodplains, Environmental Restoration Program sites). The analysis also determines the supportable population at Little Rock AFB, based on housing capability (Section 2.0). Additionally, the analysis examines the Base's ability to provide basic infrastructure support to the expanded population and facilities (Section 3.0). As a result of preliminary investigations made by the 2005 Base Realignment and Closure (BRAC) Commission, it was determined that a net increase of 39 C-130-type aircraft could occur at LRAFB. Based on this potential increase of 39 additional C-130 aircraft, the Capability Analysis considers the extent to which existing airspace is able to accommodate additional aircrew training. Additionally, limitations with regard to the noise environment surrounding the Little Rock AFB airfield, as well as training airspace, is evaluated to determine any limitations with regard to the increase in use of airspace as a result of this increase in aircraft at Little Rock AFB (Section 4.0).

NON-FLYING MISSION

Little Rock AFB currently supports a baseline population of approximately 13,466 military, military dependent, student, and civilian personnel. The current effective population is 5,306 persons. Based on an analysis of potential housing, it has been determined that the base could accommodate an additional 6,916 personnel, with an effective population of 13,422 persons. Based on an analysis of the existing and future land use plans, there are 127 individual parcels totaling 1,522.6 acres of land available for development. Given specific build-out factors per land use type, over 3 million square feet (SF) of facilities could be constructed on this

developable acreage at Little Rock AFB. Associated with those facilities could be up to 360 acres of pavements, which would include roadways, sidewalks and parking areas.

The analysis evaluated the ability of the Base to provide infrastructure support both currently and under the described potential expansion. The Base's water supply, wastewater treatment, electrical supply, and natural gas supply systems were assessed to estimate their ability to accommodate expanded consumption based on current usage and system configurations. While this analysis identified several limitations to these utilities based on current configurations, each of these limitations can be readily resolved with upgraded systems; therefore, utilities are not considered to be limiting to the described potential expansion of the Base.

FLYING MISSION

The airfield at Little Rock AFB is capable of supporting the increased operations that would be associated with an increase of 39 aircraft. This analysis has shown that there currently is excess capability of aviation resources at Little Rock AFB; although this excess capability would be limited under strictly Instrument Meteorological Conditions (IMC) conditions. However, actual operations are a combination of IMC and Visual Meteorological Conditions (VMC); thus, aviation resources at Little Rock AFB would not be expected to be a limiting factor.

Noise levels associated with an increase of 39 aircraft, which is an approximately 50 percent increase in C-130 operations, on and at specific points around the airfield and in the applicable military training airspace do not exceed normally accepted standards. Therefore, noise associated with the additional aircraft would not be considered a limiting factor.

1.0 INTRODUCTION

1.1 PURPOSE

The purpose of this Capability Analysis is to estimate the maximum development potential for Little Rock Air Force Base (AFB), while considering limiting factors. The primary objective is to determine sustainable non-flying and flying mission growth potential through the 5-year planning period ending in the year 2011. The parameters evaluated in this Capability Analysis were analyzed to only that level of detail required to determine a general capacity for growth. The growth potential identified in this Capability Analysis will be used to define a potential development alternative to be assessed in the Installation Development Environmental Assessment.

1.2 GENERAL METHODOLOGY AND APPROACH

The Capability Analysis is presented in three major sections: the Non-flying Mission; Constraints Analysis; and the Flying Mission. This Capability Analysis will provide information on development potential for Little Rock AFB. To support mission expansion at Little Rock AFB, this Capability Analysis considers the net acreage available for physical development in each land use category (generally excluding parcels smaller than 3 acres) that is free of any physical and/or operational constraints (i.e., safety easements, wetlands, floodplains, Environmental Restoration Program sites). The Capability Analysis determines the supportable population at Little Rock AFB, based on housing capability (Section 2.0). The analysis also examines the Base's ability to provide basic infrastructure support to the expanded population and facilities (Section 3.0). As a result of preliminary investigations made by the 2005 Base Realignment and Closure (BRAC) Commission, it was determined that a net increase of 39 C-130-type aircraft could occur at LRAFB. Based on this potential increase of 39 additional C-130 aircraft, the Capability Analysis considers the extent to which existing airspace is able to accommodate additional aircrew training. Additionally, limitations with regard to the noise environment surrounding the Little Rock AFB airfield, as well as training airspace, is evaluated to determine any limitations with regard to the increase in use of airspace as a result of this increase in aircraft at Little Rock AFB (Section 4.0).

Although the Little Rock AFB General Plan (2001) includes a proposed land use plan that is intended to guide the location and type of physical development at the Base, this plan is currently being updated to reflect changes that have occurred since its preparation. Additionally, a Resource Capability Study (Air Education and Training Command [AETC] 2005) was recently completed that identifies existing land use areas and to a limited extent, proposed land uses. This study is a composite of the 2001 General Plan as well as actual development that has occurred at Little Rock AFB over the last several years. Therefore, the existing land use map

from this Resource Capability Study is the most recent version of existing land uses at Little Rock AFB and was used to establish a baseline condition for this Capability Analysis. During development of this Capability Analysis, it was determined that neither of the two documents listed above successfully identify future land uses at Little Rock AFB based on the currently understood projected needs of Little Rock AFB. Therefore, a new future land use map for Little Rock AFB has been developed during the course of this capability analysis, and has been used to determine the development capability and conversely, the identifiable constraints of Little Rock AFB.

After determining the current baseline conditions, the first step in the Capability Analysis was to determine the maximum installation development potential based on available acreage per land use category from the future land use map. The next step was to determine the sustainable population based on potential housing availability. The resulting maximum developable land and sustainable population were then evaluated with respect to potentially limiting factors such as utility systems. Finally, the capability of aviation resources at the airfield and the associated training airspace, as well as the noise environment surrounding Little Rock AFB and the training airspace used were evaluated to determine the maximum growth potential for the flying mission.

2.0 NON-FLYING MISSION CAPABILITY

2.1 INTRODUCTION

This section identifies the baseline conditions at Little Rock AFB, and based on this, the non-flying mission capability is analyzed. Current units, functional groups, and tenants at the base are identified; the current population at the base is presented; as is the current land use plan. Based on this background information, the projected population capability is determined based on the ability of the base to house additional personnel. Developable acreage is identified from the future land use map, and current development densities are applied to these parcels to determine development potential per land use area. The total expansion potential of Little Rock AFB's non-flying mission is expressed in terms of population and square footage of facilities.

The result of this land use and sustainable population analysis is an estimate of building space, pavements, and population that can be incorporated into the lands currently available for development at Little Rock AFB. The estimated growth from available lands does not account for demolition of existing structures or any other modifications at the base that could render currently unavailable lands available.

The remainder of Section 2.0 is organized as follows: Section 2.2 describes the assumptions used to develop the non-flying mission capability analysis; Section 2.3 presents existing functional groups and their missions; Section 2.4 describes existing and future land uses at Little Rock AFB; Section 2.5 presents current and future land uses; Section 2.6 identifies potentially developable parcels; and Section 2.7 summarizes the non-flying mission capability. The process for evaluating the non-flying mission capability at Little Rock AFB is shown in Figure 2.1-1.

2.2 ASSUMPTIONS

The following general assumptions are applicable to the analysis of Little Rock AFB's non-flying mission capability:

- The capability of the Base is estimated using data from the General Plan, the Resource Capability Study, and other data collected during the site visit (such as population statistics).

- Any development that is either in progress or has been completed since the General Plan is included in the baseline for the Capability Analysis.

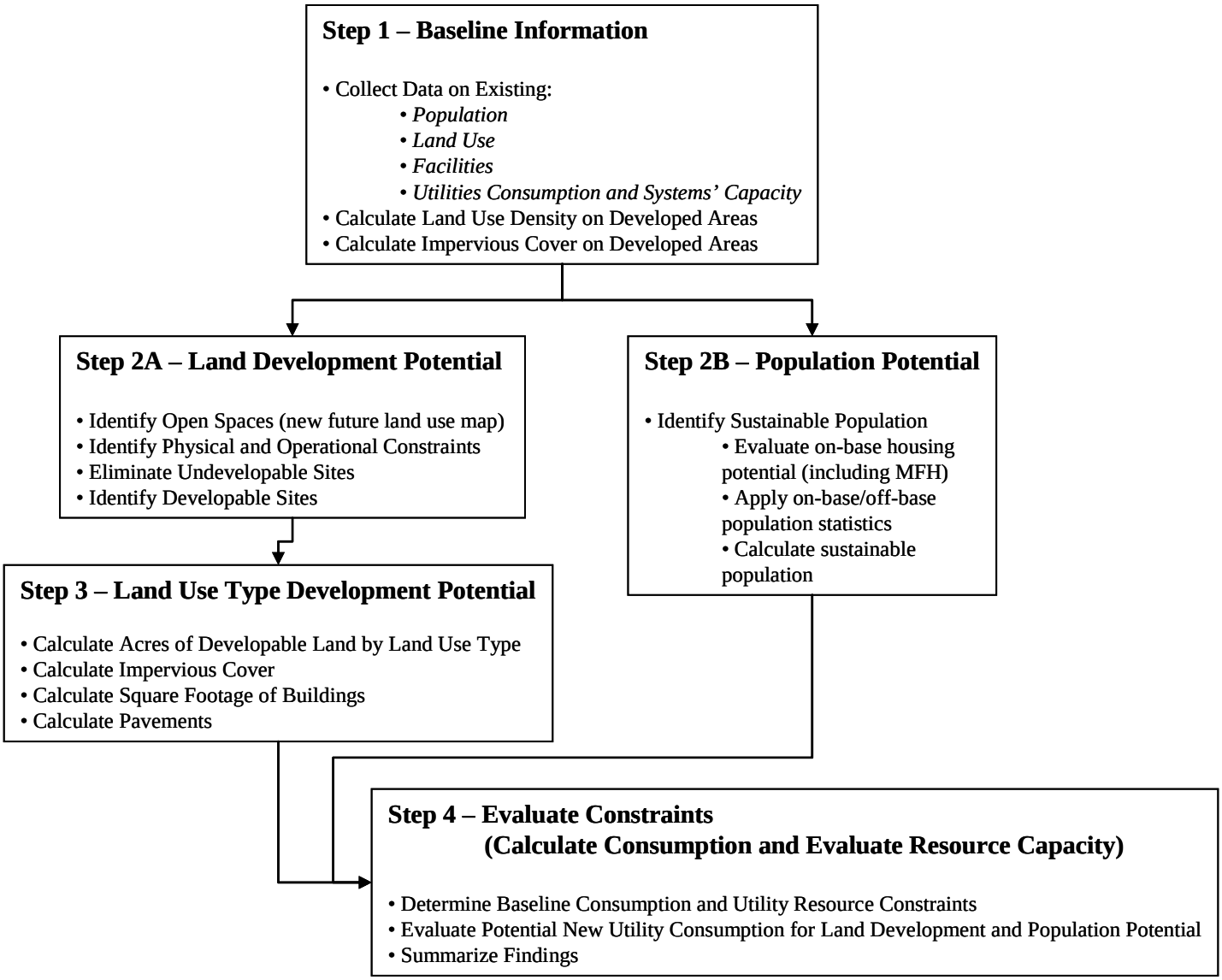


Figure 2.1-1. Non-Flying Mission Capability Analysis Process Flow Diagram

- The existing baseline population is based on the average population during the 2005 calendar year.

- The maximum development of developable parcels within each land use category at Little Rock AFB is based upon the existing development ratio within each land use area.

- In general, developable parcels are identified only if they are greater than 3 acres. In some cases, parcels smaller than 3 acres have been identified in the more heavily developed portions of the installation.

- The existing base population is analyzed to provide estimates of the effective population, which represents the population served by utility systems during a 24-hour period.

- It is assumed that tenant unit missions remain the same over time (i.e. same aircraft).

- Additional dependent personnel increases are estimated using ratios developed for permanent party personnel increases.

2.3 MISSION AND ORGANIZATIONS

Little Rock AFB is home to the 314 AW, as well as many tenants, all of which are described in the following sections. Collectively, these units and functional groups account for 7,163 military and civilian personnel located at Little Rock AFB.

2.3.1 314TH AIRLIFT WING

The 314 AW is the host unit at Little Rock AFB, which is the premier C-130 training base in the Department of Defense (DoD), training C-130 crew members from all branches of the service and the United States (U.S.) Coast Guard, as well as students from 28 allied nations. The 314 AW is comprised of four groups, including operations, maintenance, mission support and medical, as well as a headquarters element.

2.3.1.1 314th Operations Group

The 314th Operations Group is composed of four flying squadrons, an operations support squadron, and a flying detachment.

- The 53d Airlift Squadron (53 AS) and 62d Airlift Squadron (62 AS) are DoD C-130E Formal Training Units providing initial/mission qualification training to personnel from U.S. Air Force (USAF), sister services, and 28 allied nations.

- The 48th Airlift Squadron (48 AS) is the DoD's only C-130J Formal Training Unit providing initial/mission qualification training to personnel from USAF, sister services, and allied nations.

- The 314th Operations Support Squadron (314 OSS) orchestrates operations planning and scheduling, aircrew support activities, and airfield operations for Little Rock AFB.

2.3.1.2 314th Maintenance Group

The 314th Maintenance Group provides direct support for the wing's primary mission forces, an Air Mobility Command (AMC) operational group, and the Mobility Weapons School. The unit mission includes direct sortie production, aircraft equipment support, aircraft preventive maintenance and inspections, component repair, maintenance training, and health of the fleet management. The group is composed of a command staff element and three reporting squadrons; 314th Maintenance Operations Squadron, 314th Maintenance Squadron, and 314th Aircraft Maintenance Squadron.

- The 314th Maintenance Operations Squadron supports maintenance of a fleet of C-130 aircraft at Little Rock AFB. Additionally, the squadron also manages the training requirements for all maintenance group personnel.

- The 314th Maintenance Squadron performs vital intermediate aircraft maintenance and support for all assigned Little Rock AFB C-130 aircraft and various transient aircraft 24 hours a day, 365 days a year. The squadron consists of eight diverse flights that are functionally organized to support all critical aircraft systems with on- and off-equipment repair and direct sortie support.

- The 314th Aircraft Maintenance Squadron is responsible for servicing, inspecting, maintaining, launching, and recovering assigned C-130 aircraft. The squadron provides sortie production and aircraft equipment support to C-130 initial and mission qualification training personnel for the USAF, sister services, 28 allied nations, and Mobility Weapons School flying operations.

2.3.1.3 314th Mission Support Group

The 314th Mission Support Group ties together supply, transportation, contracting, aerial port, security forces, contracting, services, communications, and civil engineer functions. The group consists of seven squadrons.

- The 314th Civil Engineering Squadron (CES) provides base support for a continuous training mission and ensures access for a global airlift mission. The Squadron does this by acquiring and improving facilities and the environment, ensuring the base is prepared to respond to wartime contingencies and peacetime disaster operations, eliminating or reducing the threat of hazardous explosive ordnance, and providing a high-quality platform from which the wing can operate effectively.

- The 314th Communications Squadron provides fixed Command, Control, Communications and Computer Systems (C4) information management and visual-information systems and services to the 314 AW, 463d Airlift Group (463 AG), and other associate organizations, as well as seven Air National Guard units in three states.

- The 314th Contracting Squadron provides contracting support to maintain maximum combat effectiveness to the 314 AW, nine major tenant units, and two Reserve Officer Training Corps units. The contracting squadron processes supply, services, and construction actions in compliance with Congressional statutes, as implemented by the DoD and the USAF. They also train and deploy contingency contracting officers for worldwide contingencies.

- The 314th Logistics Readiness Squadron provides Little Rock AFB with the full spectrum of logistics support. They manage 540 vehicles worth $34.9 million; a 21,807 line item supply account worth $171 million; and issue 21 million gallons of JP8 fuel annually. Additionally, they build and recover loads for the DoD's largest aerial delivery operation, provide multimode cargo and passenger movements, and are responsible for wing deployment planning, training, and execution.

- The 314th Mission Support Squadron provides customer service to service members and federal employees assigned to Little Rock AFB, military family members, and military retirees and their family members. The squadron provides customer service through the military personnel, civilian personnel and education services flights, the first term airmen's center, the family support center, and the Airman Leadership School.

- The 314th Security Forces Squadron provides a three-fold mission:

    - The operations flight protects assets critical to the war-fighting efforts, and provides law enforcement and physical security services and criminal investigation activities for the Base population. It safeguards C-130 aircraft, transient aircraft, and associated aerospace equipment. This flight provides pass-and-registration service to the Base populace. The police services element educates members on crime

prevention, manages the wing's resources-protection program, and conducts resources-protection training and surveys.

- The resources-and-training flight trains, equips, and mobilizes air-base-defense personnel and military working dog teams for worldwide deployment, and it maintains equipment and supplies. It trains wing and tenant members in small-arms employment and ensures assigned personnel receive continuation training to meet future challenges.

- The administration-and-reports flight conducts information-security program reviews, monitors preliminary inquiries, prepares the national crime report inputs, processes security clearances and agreements, and processes action reports.

- The 314th Services Squadron promotes the 314 AW mission by providing quality programs to ensure peacetime and wartime capability through appropriated/non-appropriated fund activities; facilitating physical fitness, unit, and community cohesion; and promoting family well-being and quality of life, using available resources prudently to provide customer-driven services. The goal of the squadron is to provide programs and activities to enhance force readiness and esprit de corps by fostering the well-being of USAF members, their families, and other eligible members of the military community.

2.3.1.4 314th Medical Group

The 314th Medical Group is an outpatient clinic that offers family practice, pediatrics, and flight medicine services to support worldwide USAF operations. The 314th Medical Group also provides women's health, physical therapy, optometry, life skills, and dental clinics along with a full array of diagnostic services and prevention programs.

2.3.2 TENANTS

2.3.2.1 463d Airlift Group

The 463 AG is a direct reporting unit of over 1,200 personnel employing 30 C-130 aircraft performing worldwide airlift missions. It provides direct support to warfighting combatant commanders with theater combat aerial delivery of personnel and their resupply worldwide. The 463 AG executes a 23,000 hour flying program and operates a budget of over $60 million. The Group is comprised of five squadrons (two flying, two maintenance, and one support).

2.3.2.2 96th Aerial Port Squadron

The 96th Aerial Port Squadron prepares individuals to deploy and perform aerial port operations anywhere, at anytime in support of USAF global airlift requirements.

2.3.2.3 189th Airlift Wing, Arkansas National Guard

The mission of the 189th Airlift Wing (189 AW) is to train C-130 aircrew instructor candidates to become instructors in their respective crew positions, so that they may return to their units and keep their unit members combat ready. In addition, the wing operates the Air National Guard Enlisted Aircrew Academic School, which trains all the USAF's C-130 entry-level loadmasters before they are sent across Base to the 314 AW for initial and mission qualification training. Additionally, the academic school is one of two flight engineer schools to provide entry-level flight engineer training for USAF flight engineers.

2.3.2.4 348th Recruiting Squadron

The 348th Recruiting Squadron is one of seven recruiting squadrons assigned to the 369th Recruiting Group headquartered at Lackland AFB, Texas.

2.3.2.5 Miscellaneous Tenant Units and Activities

In addition to the units identified above, Little Rock AFB is also home to a variety of other organizations. Personnel in these units and activities include contract employees, non-appropriated fund (NAF) employees, postal, bank and credit union workers, and military and civilian employees from other USAF major commands and branches of the armed services. Collectively, these tenant units and activities account for 1,684 military and civilian personnel.

2.4 BASELINE AND PROJECTED POPULATION SUMMARY

2.4.1 BASELINE POPULATION

In total, the baseline population of Little Rock AFB is 13,466 persons (Little Rock AFB 2006). There are 5,919 Appropriated Fund military personnel, which includes an average daily student load (ADSL) of 178 students; 6,303 military dependents; 525 Appropriated Fund civilians; and 719 NAF personnel. Table 2.4-1 provides a summary of the baseline population at Little Rock AFB.

Table 2.4-1. Baseline Population Associated with Little Rock AFB

Classification	*Living On-Base*	*Living in MFH*	*Living Off-Base*	*Total*
Appropriated Fund Military				
Active Duty	448	1089[1]	4,063[1]	5,600
Non-Extended Active Duty Res.			141	141
Trainees/Cadets	35		143	178
Total	**483**	**1,089**	**4,347**	**5,919**
Active Duty Military Dependents				**6,303**
Appropriated Fund Civilians				371
General Schedule				63
Federal Wage Board				91
Other				**525**
Non-Appropriated Fund (NAF) contract Civilians and Private Business				
Civilian NAF				211
Civilian Base Exchange				143
Contract Civilians				354
Private Businesses				11
Other Civilians				11
				719
Total of All				**13,466**[2]

Notes: 1. The Economic Impact Study (Little Rock AFB 2006) indicates that 5,436 military personnel live off-base, and those living in MFH are included in this number. There are 1,089 MFH units occupied at this time. Those living in MFH are considered to be living in on-base housing for purposes of this study.

2. The above table does not include the transient military population, which was 255 personnel for CY 2005.

Source: Little Rock AFB 2006

2.4.2 BASELINE EFFECTIVE POPULATION

As referenced in Table 2.4-1, there is a total current population of 13,466 personnel comprising the military and dependents residing on-Base, military residing off-Base, students, and civilian employees at Little Rock AFB. The effective population (EP) is an estimate of the population served by Little Rock AFB's utility systems during a 24-hour period. On-Base residents use the utility systems at home and at work (i.e., 24 hours), while off-Base residents are served only at work (i.e., 8 hours). Therefore, off-Base residents are only present during 33 percent of the 24-hour period. Effective population will be used as a yardstick for measuring the capability of those utility systems (water, sanitary sewer, and electrical) whose usage rates are population dependent (Section 3.2). The baseline EP, shown in Table 2.4-2, is used to determine baseline per capita usage rates for assessing utility system capacity in Section 3.

Table 2.4-2. Existing Effective Population

Category	*Population*	*Effective Population (EP) Factor*	*EP*
Military On-Base	1,537[1]	1.00	1,537
Dependents On-Base	1,634[2]	1.00	1,634
Military Off-Base	4,204	0.33	1,387
Trainees/Cadets On-Base	35	1.00	35
Trainees/Cadets Off-Base	143	0.33	47
Civilian Employees	1,244	0.33	411
Transient Personnel	255[3]	1.00	255
Total	9,052		5,306

Notes: 1. Permanent Party Units 448 + 1,089 living in Military Family Housing (MFH).
2. Based on the 1,089 military living in MFH with an average of 1.5 dependents each.
3. Based on 271 Transient Units available with an average occupancy rate of 94 percent.

2.4.3 FUTURE EFFECTIVE POPULATION

The future population capability for Little Rock AFB was derived based on an analysis of the housing potential on the base.

The current Military Family Housing (MFH) capability at Little Rock AFB is 382 two-bedroom units, 566 three-bedroom units, and 281 four-bedroom units, totaling 1,229 units with 3,586 bedrooms, an average of approximately 3 bedrooms (or 3 dependents) per unit. There are currently 1,089 military personnel living in MFH. Based on one military person per occupied

unit and an appropriate number of dependents to fill out the units, the available MFH is an additional 140 personnel and 420 dependents. There are approximately 51 acres of developable accompanied housing parcels in the MFH areas (refer to Section 2.6.1). Based on the existing development densities associated with the current MFH areas, an estimated 239 additional accompanied housing units could be constructed on the available parcels.

The current unaccompanied housing capability at Little Rock AFB is 678 permanent party dorm rooms, 152 double occupancy student dorms that could house 304 personnel, 221 single occupancy transient military units, and 50 accompanied transient military units. There are currently 448 active duty personnel, 35 trainees, and an estimated average of 255 transient military personnel living on base. Based on one military person per occupied unit and an appropriate number of dependents to fill out the units, the aggregate unaccompanied and transient military housing has an estimated availability to house an additional 230 personnel, 269 students, 13 transient military personnel, and 3 accompanied transient military personnel. There are 23 acres identified for development in the unaccompanied housing areas (Refer to Table 2.6-1). Based upon the existing development densities in the unaccompanied and transient military housing area dorms, an additional 1,664 unaccompanied and single occupancy transient units could be constructed on the available parcels, which would provide accommodations for 1,933 additional personnel.

Table 2.4-3 summarizes the current occupancy of on-base housing (1,827 personnel), the current capability for on-base housing (2,482 personnel), and the projected future capability for on base housing units (4,385). Currently, 73 percent of the base military personnel live off base; therefore, given a capability to house an additional 2,558 military personnel on-base (Table 2.4-3), an additional 6,916 would live off-base. Thus, the capability of the base in terms of military personnel would be an additional 9,474 personnel.

The potential future effective population of 13,422 is determined based on this analysis of housing capability and assuming a 10 percent increase in trainees (both on-base and off-base), and civilian employees (Table 2.4-4).

Table 2.4-3. Current and Future On-Base Housing Unit Capability

Category	*Current Military Population*	*Current Housing Capability*[1]	*Current Excess Capability*
Accompanied Housing (MFH)	1,089	1,229	140
Permanent Party Rooms	448	678	230
Student Rooms	35	304	269
Transient Rooms (single occupancy)	47	50	3
Total	1,827	2,482	655
Category	*Current Military Population*	*Future Housing Capability*[1]	*Future Excess Capability*[1]
Accompanied Housing (MFH)	1,089	1,468[2]	379
Permanent Party Rooms	448	678	230
Student Rooms	35	1,968[3]	1,933
Transient Rooms (single occupancy)	208	221	13
Transient Rooms (accompanied)	47	50	3
Total	1,827	4,385	2,558

Notes: 1. Dependents excluded in the above estimates.
2. Current capability of 1229 + 239 additional units.
3. Current capability of 304 (152 double) + 1664 additional (single) units.

Table 2.4-4. Future Effective Population

Category	*Population*	*Effective Population (EP) Factor*	*EP*
Military On-Base	4,385[1]	1.00	4,385
Dependents On-Base	4,554	1.00	4,554
Military Off-Base	11,120[3]	0.33	3,670
Trainees/Cadets On-Base	39[4]	1.00	39
Trainees/Cadets Off-Base	157[4]	0.33	52
Civilian Employees	1,368[4]	0.33	451
Transient Personnel	271	1.00	271
Total	21,894		13,422

Notes: 1. 1,468 on-base future MFH housing capability + 678 permanent party dorms + 1,968 student capability + 221 transient rooms (single) + 50 transient (accompanied) capability (Table 2.4-3).
2. 1,468*3 dependents per MFH unit + 50*3 dependents per accompanied transient military unit.
3. 4,204 (Table 2.4-2) + additional 6,916 (Section 2.4.3) off-base (based on 73 percent live off-base).
4. Assume an increase of 10 percent.

2.5 LAND USE

The General Plan (2001) and the subsequent Resource Capability Study for Little Rock AFB (2005) provide the basis for the existing land uses on Little Rock AFB. The future land use plan from both of these studies did not fully examine the potential uses of parcels on Little Rock AFB. This effort has since been accomplished by Little Rock AFB personnel during the development of this study. This future land use map, which should be viewed as a work in progress, is the basis of the analysis within this study. While it is not an approved future land use plan, it is likely to be approved in the Master Plan update, which is currently in-process. While there may be some minor changes during the update process, it is unlikely to have substantive changes.

2.5.1 CURRENT LAND USE

As shown in Figure 2.5-1, which illustrates the current land use plan from the Resource Capability Study (2005), any large parcels that did not have active development on them were classified as open space. Table 2.5-1 provides a key to the land use classification scheme and relates the color coding to its corresponding land use category.

In general, the current land use plan illustrates that the planning objective has been to locate industrial, aircraft operations, and maintenance land uses north of Sixth Street. Administration,

community, and housing land uses are located south of Sixth Street. As stated in the General Plan, the installation's goal has been to consolidate compatible functions within the same land use areas to improve operational efficiency and safety, improve traffic circulation patterns, and provide aesthetic areas that enhance the quality of life for personnel.

Table 2.5-2 summarizes the current distribution of land uses for Little Rock AFB. The open space land use is Little Rock AFB's largest category, accounting for 3,290.8 acres, or more than 53 percent of the Base's total acreage. This is because most land that has not been actively utilized under one of the other categories has been defaulted to the open space category. These land use area categories have been updated with a new future land use plan (Figure 2.5-2). The next largest land use is airfield, with 735 acres, or about 12 percent.

2.5.2 FUTURE LAND USE

As previously indicated, the future land use maps from existing documentation have not categorized the majority of parcels into active land uses, but have left these parcels listed as open space. For the purposes of identifying capability at the base per land use area, this issue needed to be resolved. A General Plan update is currently underway, and Little Rock AFB personnel have developed a new future land use map to incorporate into this new plan. The new future land use map (Figure 2.5-2) identifies functionally compatible land uses for most of the parcels that were previously defaulted to open space.

Table 2.5-3 summarizes the distribution of land uses per the future land use plan for Little Rock AFB. As can be seen, the acreage of open space has been reduced substantially due to logically categorizing many of these parcels into active uses.

2.6 DEVELOPABLE VACANT LAND

A review of base aerial photographs and land use planning maps identified 127 vacant, developable parcels, ranging in size from 1.1 to 105 acres (Figures 2.6-1 and 2.6-2). In total, these parcels account for 1,522.6 acres of Little Rock AFB, or 24.6 percent. Table 2.6-1 summarizes the amount of vacant land available for long-range expansion of Little Rock AFB. The gross acreage is the quantity of land by land use category taken from the future land use plan (Figure 2.5-2). Vacant acreage consists of those parcels that are currently vacant, while developable acreage is that which is not constrained by environmental factors (i.e., wetlands, floodplains, safety easements, etc.) and in general are greater than 3 acres in size. Some parcels smaller than 3 acres were identified within some of the more highly developed portions of the base.



Figure 2.5-1. Current Land Use at Little Rock AFB

Table 2.5-1. Land Use Definitions

Land Use Category	*Map Color*	*Typical Facilities and Features*
Administrative	Rust	Headquarters, civilian personnel, education center, law center, security operations.
Airfield Operations and Maintenance	Light Gray	Aircraft operations and maintenance, hangars, shops, docks, control tower, fire station.
Airfield	Dark Gray	Runway, taxiways, aircraft aprons, and buffer areas other than clear zones.
Clear Zone	Sand	Safety zones surrounding the airfield.
Community-Commercial	Orange	Commissary, exchange, club, dining facility, recreation center, gym, bank.
Community-Service	Dark Blue	Post office, library, chapel, childcare center, youth center.
Housing-Accompanied	Yellow	Family housing.
Housing-Unaccompanied	Olive Green	Housing for singles, visitor housing.
Industrial	Lavender	Base engineering, maintenance shops, storage, warehousing, and utilities.
Medical	Medium Blue	Clinic, medical storage, and vet.
Open Space	Dark Green	Conservation area, buffer space.
Outdoor Recreation	Light Green	Outdoor courts and fields, stable, swimming pool, golf course, hunting, fishing, hiking, bike trails.
Training	Dark Purple	Classrooms, Combat Aerial Delivery School, and flight training, firing range.
Water	Light Blue	Ponds, lakes.

Source: AETC 2005

Table 2.5-2. Current Land Use Acreage by Land Use Category

Land Use Category	*Acres*	*Percent Distribution*
Administrative	71.7	1.2
Aircraft Operations and Maintenance	186.6	3.0
Airfield	735.2	11.9
Clear Zone	413.2	6.7
Community-Commercial	69.5	1.1
Community-Service	18.7	0.3
Housing-Accompanied	346.7	5.6
Housing-Unaccompanied	69.9	1.1
Industrial	420.8	6.8
Medical	13.5	0.2
Open Space	3,290.8	53.1
Outdoor Recreation	423.6	6.8
Training	90.0	1.5
Water	42.7	0.7
Total	6,192.9	100.0

Source: AETC 2005

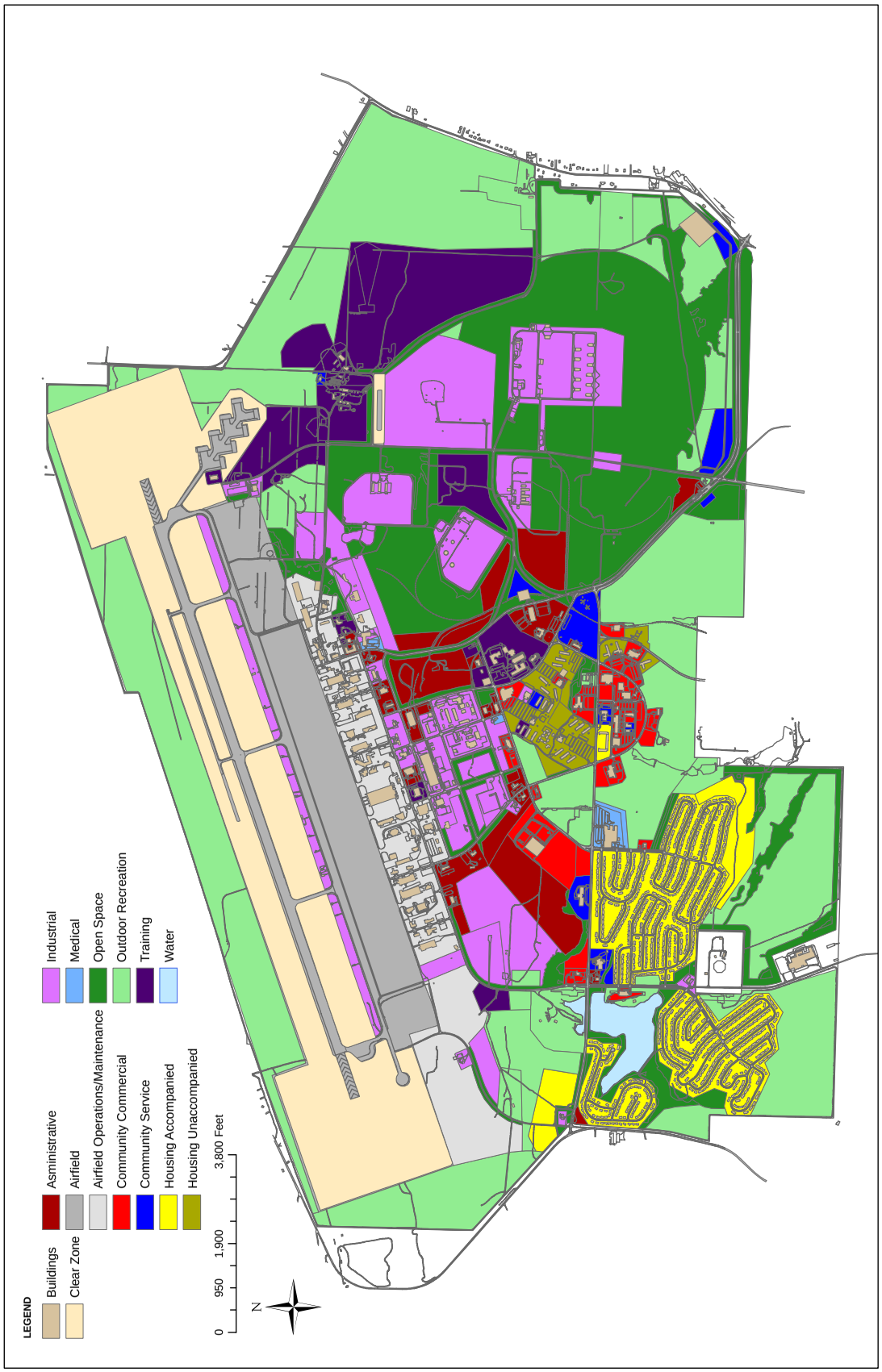


Figure 2.5-2. Future Land Use at Little Rock AFB

Table 2.5-3. Future Land Use Acreage by Land Use Category

Land Use Category	*Acres*	*Percent Distribution*
Administrative	225.6	3.6
Aircraft Operations and Maintenance	313.2	5.0
Airfield	801.9	12.9
Clear Zone	413.2	6.7
Community-Commercial	124.9	2.0
Community-Service	70.7	1.1
Housing-Accompanied	404.4	6.5
Housing-Unaccompanied	79.3	1.3
Industrial	653.5	10.6
Medical	19.1	0.3
Open Space	1,043.1	16.9
Outdoor Recreation	1,631.2	26.4
Training	370.1	6.0
Water	42.7	0.7
Total	6,192.9	100.0

Source: AETC 2005

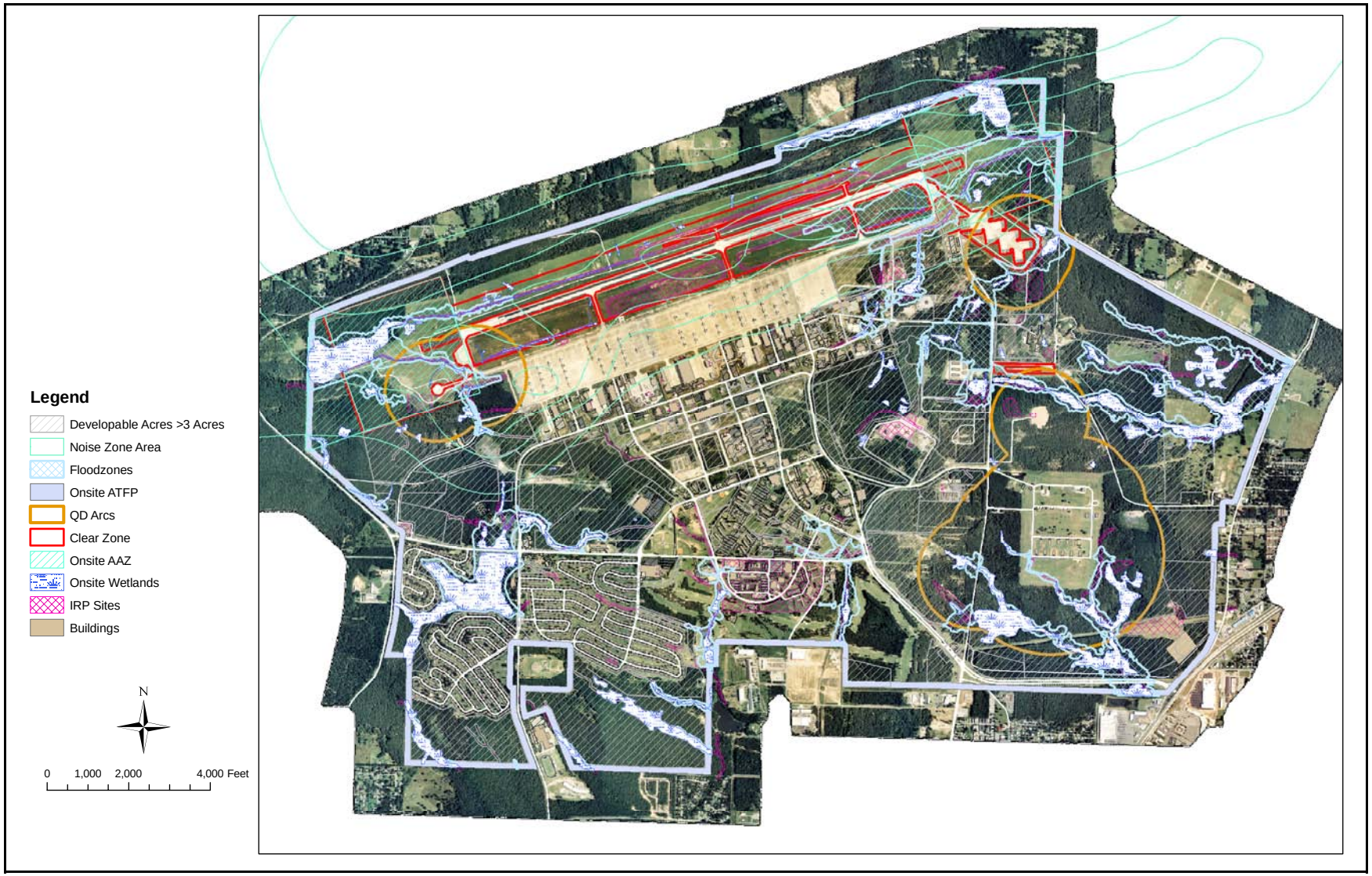


Figure 2.6-1. Developable Parcels in Relation to Constraints at Little Rock AFB

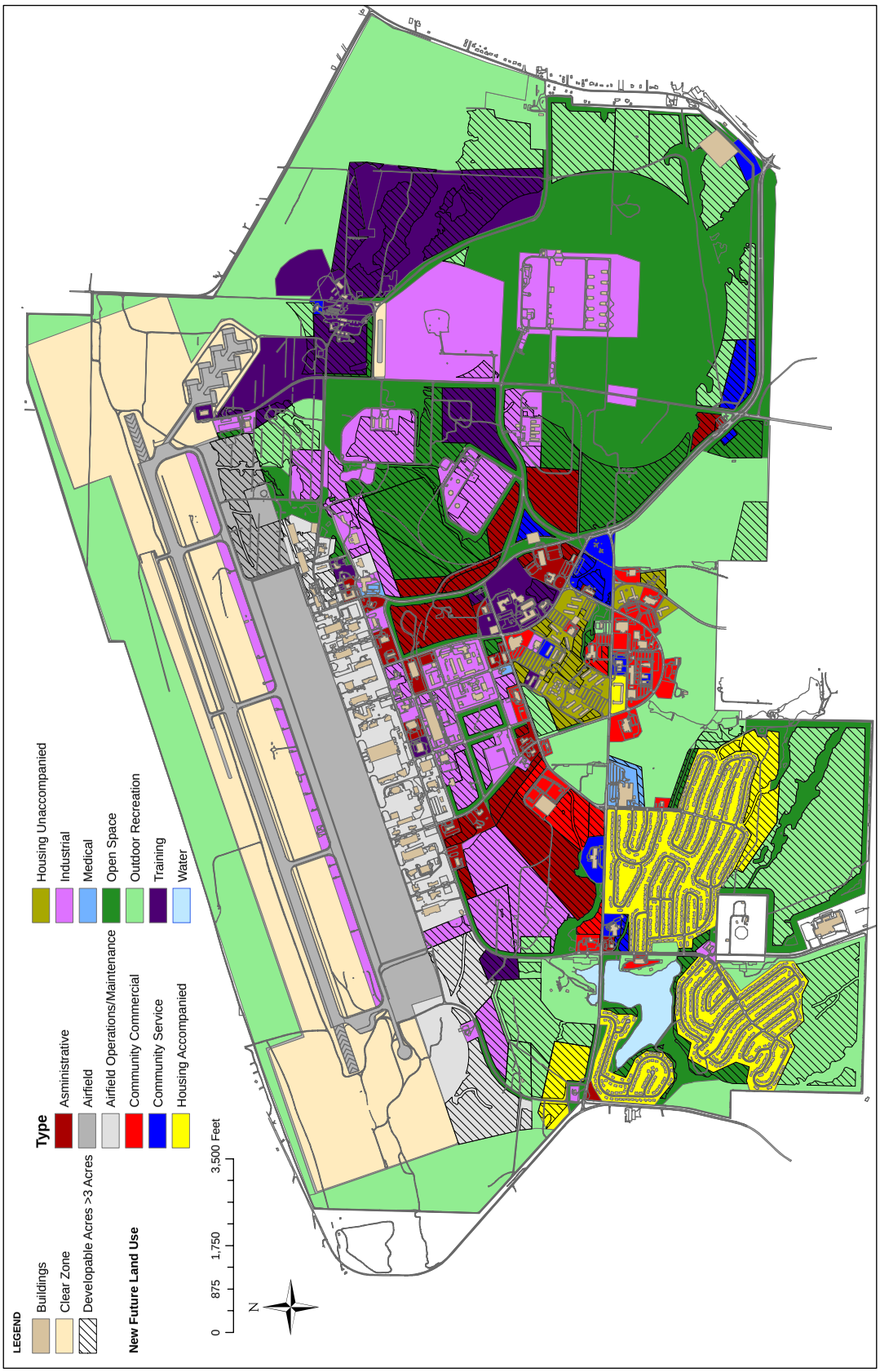


Figure 2.6-2. Vacant Developable Parcels at Little Rock AFB

Table 2.6-1. Vacant Developable Acreage by Land Use Category

Land Use Category	*Future Land Use Gross Acreage*	*Currently Developed Acreage*	*Undeveloped Acreage*	*Constrained Acreage*	*Developable Acreage*
Administrative	225.6	65.6	160.0	1.2	158.8
Aircraft Operations and Maintenance	313.2	180.3	132.9	51.4	81.5
Airfield	801.9	735.6	66.3	20.3	46.0
Clear Zone	413.2	413.2	0.0	0.0	0.0
Community-Commercial	124.9	69.5	55.4	27.1	28.3
Community-Service	70.7	18.7	52.0	20.8	31.2
Housing-Accompanied	404.4	346.7	57.7	6.6	51.0
Housing-Unaccompanied	79.3	56.1	23.2	0.0	23.2
Industrial	653.5	420.8	232.7	7.2	225.4
Medical	19.1	13.5	5.6	2.4	3.2
Open Space	1,043.1	0.0	1,043.1	836.4	206.8
Outdoor Recreation	1,631.2	415.8	1,215.4	718.5	496.9
Training	370.1	82.0	288.1	117.9	170.2
Water	42.7	0.0	42.7	42.7	0.0
Total	6,192.9	2,817.7	3,375.2	1,852.6	1,522.6

Note: Due to rounding, columns may not add up exactly.
Source: AETC 2005

Based on the current development ratios per land use area, the square footage of building and pavements that can be accommodated within these developable areas can be estimated. As shown, Little Rock AFB can accommodate an additional 3 million square feet (SF) of building space, with an accompanying 360 acres of pavements, which would include roadways, sidewalks, and parking areas. A summary of this potential development per land use area is found in Table 2.6-2; however, the detailed calculations for this summary can be found in Appendix A.

Table 2.6-2. Summary of Potential Development Per Land Use Category

Land Use Category	*Developable Acreage*	*Building Square Footage Capability (SF)*	*Pavement Acreage Capability (Acres)*	*Total Impervious Surface Capability (Acres)*
Administrative	158.8	719,795	81.0	96.0
Aircraft Operations and Maintenance	81.5	527,001	38.0	50.1
Airfield	46.0	0	23.4	23.4
Clear Zone	0.0	0	0.0	0.0
Community-Commercial	28.3	13,928	16.6	20.1
Community-Service	31.2	202,187	12.5	16.4
Housing-Accompanied	51.0	429,925	9.8	19.7
Housing-Unaccompanied	23.2	219,686	11.2	13.8
Industrial	225.4	351,818	57.7	65.8
Medical	3.2	35,298	1.5	2.1
Open Space	206.8	10,001	5.8	6.1
Outdoor Recreation	496.9	554	64.4	64.4
Training	170.2	366,586	38.1	45.8
Water	0.0	0.0	0.0	0.0
Total	1,522.6	3,016,790	360.1	423.6

Note: Due to rounding, columns may not add up exactly.

2.7 SUMMARY

Little Rock AFB currently supports a baseline population of approximately 13,466 military, military dependent, student, and civilian personnel. The current effective population is 5,306 persons. Based on an analysis of potential housing, it has been determined that the base could accommodate an additional 6,916 personnel, with an effective population of 13,422 persons. Based on an analysis of the existing and future land use plans, there are 127 individual parcels totaling 1,522.6 acres of land available for development. Given specific build-out factors per land use type, over 3 million SF of facilities could be constructed on this developable acreage at Little Rock AFB. Associated with those facilities could be up to 360 acres of pavements, which would include roadways, sidewalks and parking areas.

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3.0 CONSTRAINTS ON TOTAL EXPANSION POTENTIAL

3.1 INTRODUCTION

The purpose of this section is to determine the capability of Little Rock AFB's primary housing and utility resources relative to the current demand requirements of the Base and to identify available capability for facility growth based on the current configuration of these resources. As established in Section 2.0 and detailed in Appendix A of this report, the developable areas of the Base can accommodate the construction of over 3 million SF of interior building space covering a wide range of uses. An analysis of potential population increases based on available lands for housing development, and current housing usage identified a potential to increase the base population by 112 percent over the current total population with a resulting 133 percent increase over the current effective population. The analysis presented in this section will evaluate potential constraints on this projected growth based on available headroom from current housing and utility resources.

3.2 CONSTRAINTS ANALYSIS

3.2.1 HOUSING

As described in Section 2.4.3, MFH currently has an estimated capability to house an additional 140 military personnel and 420 dependents. Assuming one military person per occupied unit and an average number of dependents in the accompanied units, the aggregate unaccompanied and transient housing has a current estimated capability to house an additional 230 personnel, 269 students, 16 transient personnel and 9 dependents.

As described in Section 2.0, there are approximately 51 acres of developable accompanied housing parcels in the MFH areas and another 23 acres identified for development in the unaccompanied housing areas. Based on the existing development densities, an estimated 239 additional accompanied housing units could be constructed on the available parcels and an additional 1,664 unaccompanied and single occupancy transient units could be constructed on the available parcels.

Table 2.4-3 summarized the current occupancy against the currently available and projected on base housing units identified for on base housing. Presently, 73 percent of the base military personnel live off base.

3.2.2 UTILITIES

The supply of utility services to Little Rock AFB could affect its ability to support additional personnel and facilities. Therefore, the purpose of this analysis is to identify whether the Base's primary utility systems pose a limitation to potential expansion. The Base's water supply, wastewater treatment, electrical supply, and natural gas supply systems are assessed in this section to estimate their ability to accommodate expanded consumption based on current usage and system configurations. Details of this analysis can be found in Appendix B. The following general assumptions are applicable to the analysis of Little Rock AFB's utility systems:

- It is assumed that the current maximum capability of water utility services is based upon the existing pump capacity.
- It is assumed that the current maximum capability of wastewater utility services is based upon the existing negotiated contract agreements, maximum pipeline capacity, and infiltration amounts.
- It is assumed that the current maximum capability of natural gas utility services is based upon the existing capacity of the main service line.
- It is assumed that the current maximum capability of electrical utility services is based upon the existing switching station capability.

3.2.2.1 Revised Effective Population

In order to assess the increased Base population's impact on utility systems, it was restated in terms of an effective population. As shown in Table 2.4-4, the potential future effective population is 12,354 persons. This total is 7,048 persons higher than the baseline effective population, which is an increase of 133 percent.

3.2.2.2 Potable Water Supply

Little Rock AFB purchases treated potable water from Jacksonville Water Works (JWW), which provides surface water from Lake Maumelle and groundwater from wells in Lonoke County for a combined production capacity of 9.5 million gallons per day (MGD). Based on year 2000 data, the JWW was producing water at 62 percent of its stated capacity and Little Rock AFB was reportedly using 15 percent of this water at that time (City of Jacksonville 2005).

The storage capacity at JWW is 7.25 million gallons (MG), which includes a 2.25-MG elevated storage and a 5-MG ground storage tank. The 5-MG tank feeds the water main dedicated to

Little Rock AFB and is topped off daily or more frequently as needed. In the event of a power failure at JWW and its well fields, a 3-MGD gravity fed water supply from a 24-inch main out of North Little Rock would still be available (City of Jacksonville 2005).

There are two 2,500 gallon per minute (gpm) rated pumps on Little Rock AFB that operate independently and one 235 gpm pump for the golf course. The total current maximum pumping capability is 2,735 gpm, which is equivalent to 3.94 MGD (personal communication, Whitt 2005). The current Base pumping capability is approximately 41 percent of the currently rated JWW production capacity.

The Base water system consists of over 300,000 linear feet of lines and 1,340,000 gallons of ground level storage for the potable water system. The flight line has 25,000 linear feet of water lines and 1,140,000 gallons of non-potable storage with its own pumping station dedicated to fire fighting in the hangars. The non-potable water storage system may be supplemented or refreshed by the potable water system in the event of a fire (personal communication, Whitt 2005).

The water distribution system was constructed in 1955-1956 and is primarily composed of ductile iron. There have been major improvements recently to include a new pump station, several thousand feet of new polyvinyl chloride (PVC) main lines, and a new 16 inch water supply line from the JWW tank to the Base tank. Two circulation pump stations, with chlorine injection capabilities, have been installed on remote loops of the Base to enhance water quality but are currently not adding chlorine.

The highest maximum daily potable water demand on file between 2000 and 2005 was 1.8 MGD, recorded on August 23, 2003 and included irrigation water for the golf course (personal communication, Whitt 2005). Using this event as a worst case given the current population demand, the maximum estimated daily demand including a major hangar fire during a drought would be approximately 2.9 MGD, or 76 percent of the available potable water capability under the current pumping configuration. The estimated surplus capability under these conditions is 0.9 MGD. Table 3.2-1 demonstrates the current capacity, consumption, and estimated headroom for the potable water system.

Table 3.2-1. Potable Water System Capability

Category	*Million gallons per day (MGD)*	*Percent of Pump Capacity*	*Head Room (MGD)*
Pump Capacity	3.94	100%	--
Current Contractual Supply	5.00	127%	1.06
Potable Storage (MG)	1.34	34%	--
Non-potable Storage (MG)	1.14	29%	--
Highest Recorded Daily Use	1.85	47%	2.09
Average Daily Use	0.88	22%	3.06
Peak Load with Fire Water Reserve	2.99	76%	0.95

Source: Personal communication, Whitt 2005

Based on an evaluation of information presented in Section 2.4.3 of this report, the effective population could increase by as much as 133 percent over the current effective population, with a resulting increase in the population based water consumption which could generate an additional 2.5 MGD of potable water consumption. This indicates the current pumping capability is approximately 0.4 MGD less than projected demand without consideration to reserve capacity for replenishing the non-potable fire water storage. Considering fire water reserve in pumping capacity, the estimated deficit would be 1.5 MGD over the current pump capacity. The excess demand could be met by increasing the current contractually guaranteed supply by 8 percent from 5 MGD to 5.4 MGD and by replacing or reconfiguring the current pumping system. Another alternative could include reconfiguring the water-based hangar fire sprinkler system with a newer less water demanding system (e.g., a foam-based system).

3.2.2.3 Wastewater Treatment

Little Rock AFB's wastewater is conveyed to and treated by the Jacksonville Waste Water Utility's (JWWU) Johnson Regional Treatment Facility, which has a permitted average daily flow limit of 12.1 MGD (Jacksonville Wastewater Utility 2005; Arkansas Department of Environmental Quality 2005 [National Pollutant Discharge Elimination System Permit AR0041335]). Little Rock AFB's contractual agreement with the JWWU dictates payment for services as a percentage of the total facility's annual operating budget based on a running 3-year average usage compared to other clients of the JWWU. Specifications of the JWWU plant and the Little Rock AFB portion of the total flows are detailed in Table 3.2-2.

Table 3.2-2. JWWU Rate Specifications for Little Rock AFB Sewer Flows

Category	*Flow Rate (MGD)*	*Percent of Plant Flow*	*Percent of Line Capacity*	*Headroom (MGD)*
JWWU Permitted Daily Average	12.10	100%	NA	NA
Little Rock AFB Contracted Daily Average	2.477	20.47%	36.1%	NA
JWWU Daily Average (2004)	8.60	100%	NA	3.50
Little Rock AFB Daily Average (2004)	1.76	20.53%	25.7%	0.72
JWWU Daily Average (2005)	8.60	100%	NA	3.50
Little Rock AFB Maximum Daily Average (2005)	1.81	21.02%	26.3%	0.67
JWWU Permitted Daily Maximum	22.61	100%	NA	NA
Little Rock AFB Contracted Daily Maximum	4.05	17.91%	59.1%	NA
JWWU Permitted Hourly Maximum	26.85	100%	NA	NA
Little Rock AFB Contracted Hourly Maximum	4.75	17.69%	69.3%	NA

JWWU – Jacksonville Waste Water Utility
MGD – million gallons per day
Source: 314 CES/CEV 2004; personal communication, Whitt 2005

The Base sanitary sewer collection system consists of 2 major lift stations and several smaller lift stations throughout the base, over 200,000 linear feet of sewer line mains in the MFH area, over 100,000 linear feet of mains in the main Base area, and 2 miles of 24 inch sewer main located off Base that connects to the JWWU. The sanitary sewer main that connects the Base to the JWWU has a maximum capacity of 4,759 gpm (estimate based on an 18 inch line at 100 percent full flowing conditions), which translates to 6.8 MGD over a 24-hour period (personal communication, Whitt 2005). The design flow for the pipe is closer to 4.75 MGD based on a 70 percent full flowing pipe (personal communication, Whitt 2006).

The Base sewer collection systems were constructed in 1955-1956 and have been slip lined and extensively repaired over the past several years. Flow monitors for the Base and MFH area became operational in April 1998, which allow tracking of infiltration and inflow (I&I) and the effectiveness of repair projects. According to a recent Base study approximately half of the average sewage flow is comprised of I&I. In effect, the daily I&I increases the average sewage flow by approximately 100 percent. The average daily non-irrigation drinking water consumption for the year 2003 at Little Rock AFB is approximately 0.63 $\pm$ 0.23 MGD. Theoretically, this amount should be the only constituent of the sewage flow. The 2003 average daily sewage flow is approximately 1.1 $\pm$ 0.5 MGD (314 CES/CEV 2004). The only source for the difference in flows must be contributed to excess I&I.

Table 3.2-3 identifies the number of high flows above the contracted daily average, daily maximum, and hourly maximum flow rate for 2003-2005. The table also lists the number of flows higher than 90 percent of the same parameters. This information is of interest to review the effects of hydraulic overload and determine if statistical occurrences do exist that would warrant concern and/or future improvements. The 90 percent flows are a good indication of the likely occurrence of design exceedences by quantifying the number of "near misses."

Table 3.2-3. Frequency of Sewer System Criteria Exceedence

Category	*Criteria*	*2003*	*2004*	*2005*
Contracted Daily Average Flow (2.477 MGD)	>100%	9	20	12
	>90%	12	28	15
Contracted Daily Maximum Flow (4.05 MGD)	>100%	1	1	0
	>90%	1	2	3
Contracted Maximum Hourly and Pipeline Design Flow (4.75 MGD)	>100%	4	108	41
	>90%	78	261	105
Sewer Flow Rates Above Average Daily Potable Water Demand	>0.63 (MGD)	364	365	257
	>0.83 (MGD)	216	322	325

Source: 314 CES/CEV 2004; personal communication, Whitt 2006

The first conclusion drawn from this table is the large variance between the average daily drinking water consumption and groundwater contribution. This is explained by an estimated I&I of approximately 800 gallons per diameter inch-mile (314 CES/CEV 2004). This volume is fourfold that of industrial standards and state codes that call for a maximum limit of no more than 200 gallons per diameter inch-mile. If the Base were to aggressively improve the existing system to accepted construction standards, i.e., sewage systems with a 200 gallon/inc-mile I&I limitation, the groundwater contribution would be reduced by 75 percent. An I&I reduction of this magnitude would allow the Base to effectively double its mission, including personnel, facilities, and airplanes, without the need to increase the sewage plant capacity.

High volumes are not the only deleterious effect of elevated I&I. Excessive flow rates have a negative impact on sewage treatment plants in two aspects. First, volumes and flows above design specifications result in unnecessary elevated operational and maintenance costs. The higher volumes and flows require process equipment, e.g., digesters, aerators, clarifiers, etc., to be operated (with additional man-hours) for longer periods of time. Secondly, the effectiveness of the sewage plant is reduced when it encounters high volumes and flows above design

conditions. Peak efficiency is always obtained when the plant is operated below design specifications.

Although the existing JWWU plant is currently capable of treating the Base sewage flow, the plant could be affected by future contracts with new developers. If the Base does not improve its sewer system, the increasing I&I will eventually affect the JWWU capacity. Over time other customers could be affected by the Base's I&I issues.

Based on an evaluation of information presented in Section 2.4.3 of this report, the effective population could increase by as much as 133 percent over the current effective population and a subsequent increase in the population-based wastewater production would generate an additional 2.5 MGD over the current 1.8 MGD of waste water consumption. The current contractual limits would need to be increased from 20 percent to 36 percent of the current JWWU permitted daily average capacity of 12.1 MGD in order to meet the new flow levels inclusive of the current I&I flows. The 6.8 MGD rated sewer pipeline operating at 70 percent by design (4.75 MGD) is not a limiting factor; however, as previously stated, correcting infiltration issues on Base would substantially reduce the load and operating costs associated with this resource.

3.2.2.4 Electrical Supply

Entergy is the present conveyor of electricity to Little Rock AFB (personal communication, Whitt 2005). The utility-owned sub-station is located directly across Marshall Road from the Base switch station, which is located just outside the main gate. The Base currently distributes primary power by four 13.8 kilovolt (kV) feeders, two for the industrial portion of the Base and two for the MFH portion. Information provided by the 314th Civil Engineering Squadron Maintenance Engineering (314 CES/CEOE) indicates on Form 3556 that the Base has a 394,204,000 kilowatt-hour (KWH) capability based on a 45 megawatt (MW) maximum load for 24 hours a day 365 days a year. The reported 2004 consumption on Form 3556 was approximately 108,000,000 KWH, or about 27 percent of the supply capability, and the reported 2004 peak load was about 20 MW, or about 44 percent of the maximum rated load (45 MW). Electrical supply is not a limiting factor for Little Rock AFB; however, enhancement and upgrades to Base exterior and interior distribution systems could improve the overall demand load factors, potentially driving down rates.

Entergy metering data for the Base for the period between October 1, 2004 and September 30, 2005 indicates a 12 month demand of approximately 99,500,000 KWH at a supply power factor ranging between 95 percent and 99 percent with an average 96 percent for the period and a demand load factor ranging between 62 percent and 94 percent with an average of 78 percent for

the period. These factors address the current efficiency in supply and consumption, where the target is 100 percent.

The exterior distribution system consists of approximately 12 miles of underground primary distribution lines, 24 miles of overhead primary distribution lines, 800 utility poles, 600 distribution transformers, as well as all exterior parking, sports, and aircraft parking apron lighting. This system is generally in good physical condition and has experienced few problems. Some of the aging infrastructure components that are of concern are the H-Frame or slab-mounted transformers, which are of the original 1955-vintage (10 facilities are fed by these types of transformers).

The Base has added a number of new buildings in the industrial portion of the Base. With the new electrical loads, it has become apparent that there is a need to reconfigure the two distribution primary feeders feeding this portion of the Base. A number of the interior systems were installed in the 1950's under the National Electrical Code of that time. The systems have become obsolete (parts are no longer available) and are overloaded. The long-range program to upgrade or repair the dilapidated systems is contained in the Long Range Infrastructure Plan.

Several projects have been programmed to replace the older transformers and also to replace the overhead electrical distribution with underground construction.

Table 3.2-4 summarizes the current capacity and consumption of the electrical utility resources at Little Rock AFB.

Table 3.2-4. Summary of Electrical Resources and Demand

Category	*Value*	*Percent of Supply*
Annual Supply (KWH)	394,200,000	100
Peak Supply (MW)	45	100
FY05 Annual Demand (KWH)	99,533,491	25
FY05 Peak Demand (MW)	20	44
Projected Annual Demand (KWH)	168,636,393	43
Projected Peak Demand (MW)	34	75

KWH – kilowatt-hour
MW - megawatt
Source: Personal communication, Whitt 2005; personal communication, Love 2006

Based on an evaluation of information presented in Section 2.6 of this report, the area of enclosed spaces (buildings) could increase by up to 69 percent over the current amount of on the Base. MFH is not included in this increase and increases in utility consumption are based on the

projected increase of 179 percent in on-Base population. The combined effect of additional building spaces (non-MFH) and additional population in the MFH area would result in a 69,102,902 KWH increase in current consumption, 31 percent of the available annual power supply. The estimated peak demand would increase from 20 MW to 34 MW, 75 percent of the available power capability.

3.2.2.5 Natural Gas Supply

Little Rock AFB receives its natural gas supply from Centerpoint Energy ARKLA via a distribution network operated by Seminole. The 8-inch gas mains leading to the Base have a rated capacity of 275,000 standard cubic feet (SCF) per hour, or 2,409,000,000 SCF per year. The operating pressure of the lines is 45 pounds per square inch (gauge) (PSIG) in the winter and 20 PSIG in the summer months and the lines are pressure rated to 60 PSIG. The Base does not provide natural gas to the MFH areas.

The peak consumption during the period between October 2004 and September 2005 occurred in January with a metered value of 38,365,000 cubic feet (210,544 SCF per hour at 32 degrees Fahrenheit and 45 PSIG), approximately 77 percent of line capacity.

Table 3.2-5 summarizes the current capacity and consumption of the natural gas utility resources at Little Rock AFB.

Based on an evaluation of information presented in Section 2.6 of this report, the area of enclosed spaces (buildings excluding MFH) could increase by as much as 69 percent over the current amount on the main Base. New MFH areas are not included in this increase. The estimated peak demand could increase to 356,448 SCF per hour, or 130 percent of the currently available distribution system capability. Annual demand would increase to 342,994,000 cubic feet (less than 58 percent of capability). The natural gas supply contracts are updated seasonally to account for variations in demand and pricing requirements and are not expected to be a limiting factor in this resource's availability. The line capacity under peak loading assumed winter time operating conditions at 32 degrees Fahrenheit and 45 PSIG. Variations in line operating temperature and pressure have a substantial impact on the estimated results, which may be conservative. Based on the available information, the line flow capacity may be limiting the capability of the Base. A more detailed analysis would assist in better defining future enhancements to the supply infrastructure as this limit is approached.

Table 3.2-5. Summary of Electrical Resources and Demand

Category	*Value*	*Percent of Line Capacity*
Annual Supply and Demand		
Annual Line Capacity (SCFx10^6)	2,409	100
FY05 Annual Supply (MCF)	202.6	NA
FY05 Annual Supply (SCFx10^6)	827.2	34
Projected Annual Demand (SCFx10^6)	1,397	58
Peak Supply and Demand		
Peak Line Capacity (SCFH)	275,000	100
FY05 Peak Demand (CFH)	51,566	NA
FY05 Peak Demand (SCFH)	210,544	77
Projected Peak Demand (SCFH)	356,448	130

SCF - standard cubic feet at standard temperature and pressure
SCFH –standard cubic feet per hour
MCF – million cubic feet (metered)
SCFx10^6 – million standard cubic feet
CFH – cubic feet per hour (metered) (CFH metered, converted to standard CFH assuming 32 degrees Fahrenheit and 45 psig operating conditions)
Projected demand based on increasing current demand by 69 percent to account for a similar increase in projected building space (excluding military family housing).
Source: Personal communication, Whitt 2005; personal communication, Love 2006

3.2.3 SUMMARY OF CONSTRAINTS ANALYSIS

Table 3.2-6 summarizes the present consumption data against capacity for the resources evaluated in this analysis. Based on the analysis of available resources, the sewer system and natural gas infrastructure are the most limiting resources at Little Rock AFB; however these are infrastructure issues that can be remedied with capital improvements projects and are not seen as being a limitation to the resource. Targeting attention to sewer system infiltration issues, potable water system supply pump capacity, and hangar fire suppression system water requirements, in addition to refining the natural gas system supply model could relieve many of the potential infrastructure limitations at Little Rock AFB.

Table 3.2-6. Summary of Resource Constraints on Potential Growth
(Page 1 of 2)

Resource Usage Category	*Present Consumption to Capacity (Percent)*	*Projected Consumption to Capacity (Percent)*
On Base Housing		
Current On Base Housing (overall occupancy of current accompanied and unaccompanied housing, including MFH)	74	171[1]
Future Available On Base Housing (overall on base population against current future housing areas)	47	100[2]
Potable Water System		
Potable Water Pumps (peak demand including fire suppression system water requirements)	76	137[3]
Potable Water Pumps (peak demand without fire water reserve)	47	109[3]
Potable Water Guaranteed Supply (peak demand including fire suppression system water requirements)	60	108[3]
Potable Water Guaranteed Supply (peak demand without fire water reserve)	37	86
Sewer System		
Sewer System Peak Supply (peak demand including uncorrected infiltration issues)	86[3]	88[4]
Sewer System Peak Supply (peak demand assuming infiltration reduced 75% to meet with national standards)	36[3]	38[4]
Sewer System Annual Supply (demand including infiltration)	73[3]	152[4]
Sewer System Annual Supply (assuming infiltration reduced 75% to meet with national standards)	30[3]	67[4]
Electrical System		
Peak Supply (peak demand against switch capability)	44	75
Annual Supply (annual demand against supplier capability)	25	31

Table 3.2-6. Summary of Resource Constraints on Potential Growth
(Page 2 of 2)

Resource Usage Category	*Present Consumption to Capacity (Percent)*	*Projected Consumption to Capacity (Percent)*
Natural Gas System		
Peak Supply (peak demand against pipeline capacity)	77	130[5]
Annual Supply (annual supply and demand against pipeline capacity)	34	58

Notes: 1. For those systems presented in this table that approach or surpass 100 percent capacity, it is important to note that for each of these utilities, this presents only an infrastructure limitation that can be remedied with capital improvement projects, rather than a limitation to the availability of the resource.
2. Future on base housing assumes 100% of available housing is utilized.
3. Appendix B tables indicate sources for the estimated consumption values. Pump capacity, supplier agreements and fire water reserves are all modifiable variables for Little Rock AFB and are not considered limitations to growth.
4. Appendix B tables and information supplied in previous sections regarding contracted daily average, maximum daily and maximum hourly flows are considered in the estimates for peak and annual consumption values. The current infiltration issue impacts the annual contracted consumption capability and not the hourly peak consumption limit or pipeline capacity.
5. Appendix B tables indicate sources for the estimated consumption values. The line capacity under peak loading assumed winter time operating conditions at 32 degrees Fahrenheit and 45 PSIG. Variations in line operating temperature and pressure have a significant impact on the estimated results, which may be conservative. Any future enhancements associated with identified natural gas supply line limitations are not a permanent limitation to growth at Little Rock AFB.

Source: Personal communication, Whitt 2005; personal communication, Love 2006

4.0 FLYING MISSION CAPABILITY

4.1 INTRODUCTION

This section assesses Little Rock AFB's flying mission capability. The assessment will consider three factors: the airfield's and the airspace's capability to support increased operations (which considers Air Traffic Control [ATC] procedures and requirements); noise levels in the immediate vicinity of the airfield; and noise levels in the military training airspace which is used to support Little Rock's mission requirements.

The assessment addresses two conditions. First, existing operations in Fiscal Year (FY) 2005 both from the base and in the training airspace are described. As a result of preliminary investigations made by the 2005 Base Realignment Commission (BRAC), it was determined that a net increase of 39 C-130-type aircraft could occur at LRAFB. Assuming a linear expansion of operations with the increased number of airframes, these increases can be compared with current conditions to consider potential limitations associated with this potential increase in assigned aircraft. It should be noted that the *capability of an airfield* to accommodate increased airframes is simply a function of square feet of ramp and parking space. However, the *capability of an airfield and associated airspace* to accommodate increased operations is a function of many variables, which are discussed below.

4.2 AVIATION RESOURCES

Aviation resources include the airfield at Little Rock AFB, the area in the vicinity of the airfield, and military training airspace used by aircraft from Little Rock AFB to accomplish training requirements.

Aviation resources on Little Rock AFB itself include the main Class B runway, an Assault Zone (AZ) strip located parallel to and immediately north of the runway, and one Drop Zone (DZ). Jacksonville DZ (Jax DZ) is located on the airfield primarily north of the main runway, and at the west end of the AZ (Figure 4.2-1) (Little Rock AFB 2004).

There are two Restricted Areas (R-2403A/B) located approximately 5 miles west of Little Rock AFB. There are two additional DZs in the Little Rock AFB area: All-American DZ (AADZ) is located on Camp Robinson within restricted area R-2403A. This complex also includes All-American Landing Zone (AALZ). This DZ is the only local DZ that accommodates High Altitude - Low Opening (HALO) or High Altitude - High Opening (HAHO) airdrops by the 22nd Special Tactics Squadron (22 STS). Finally, the Black Jack DZ (BJDZ) is located approximately 19 miles north-northeast of the base (Little Rock AFB 2004). Transit between Little Rock AFB and these training areas is supported by a network of 18 Slow Speed Low Altitude Training Routes (SRs). However, only 14 of these routes are used under current operations (Figure 4.2-2) (Markie 2005).

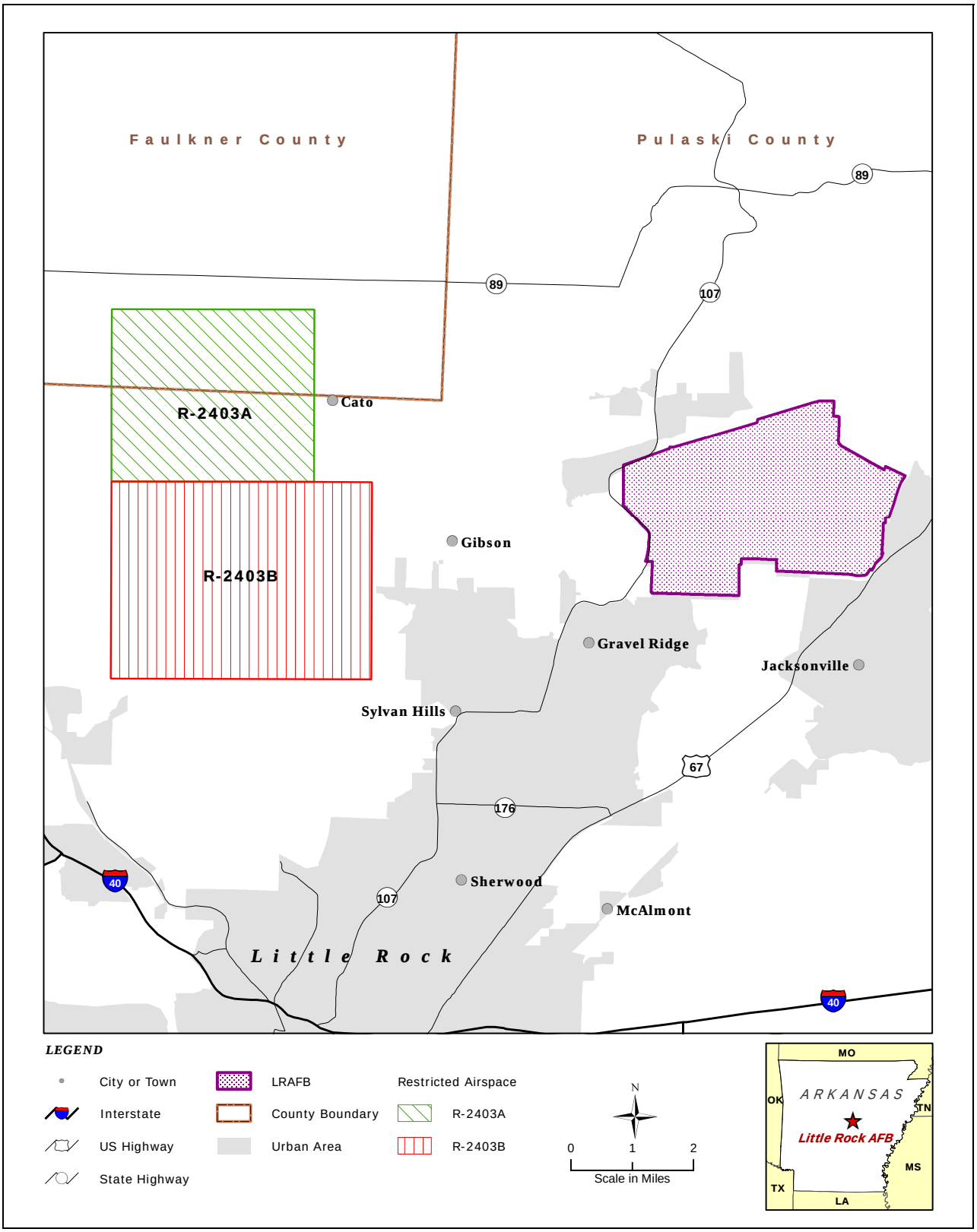


Figure 4.2-1. Restricted Airspace Associated with Little Rock AFB

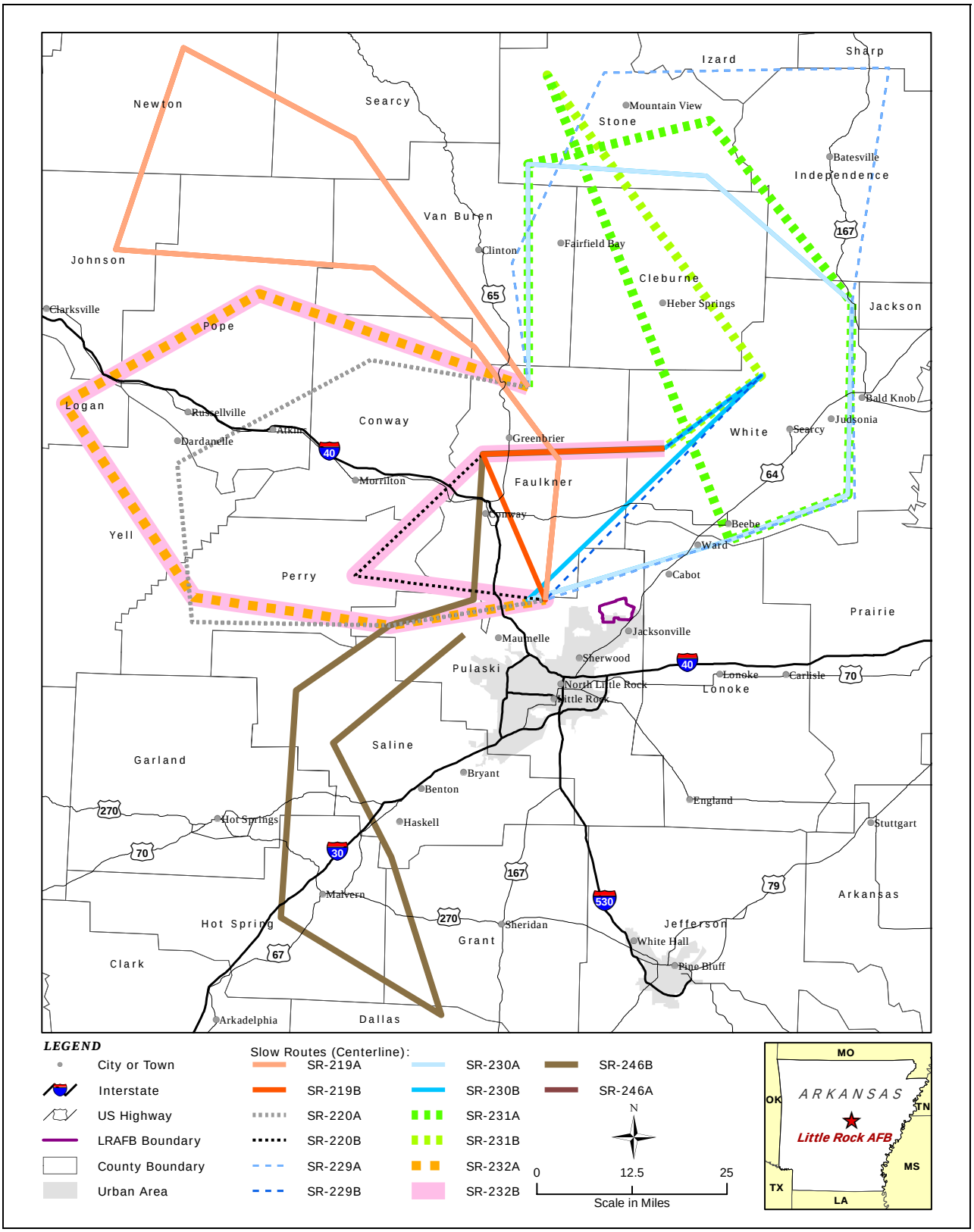


Figure 4.2-2. Slow Speed Low Altitude Training Routes Associated with Little Rock AFB

4.2.1 EXISTING AVIATION RESOURCES

4.2.1.1 Airfield

The airfield includes the runway, AZ, taxiways, aircraft parking area, ramps, and the flight line, which includes surrounding grassed areas and roads.

Runway 07/25 is 12,000 feet long and 200 feet wide with 25 foot non-load bearing asphalt shoulders. There are 1,000-foot asphalt non-load bearing overruns at each end. The AZ is 3,482 feet long and 60 feet wide with a 150 foot load bearing overrun on the east end and a 130 foot load bearing overrun on the west end. There is some gravel short of the AZ under-runs, which is used for stabilization. Under-runs are basically the same as overruns, except they are extensions located at the predominately-landing end of the runway. The AZ centerline is located 450 feet north of and parallel to the main runway centerline. All taxiways are 75 feet wide with non-load bearing shoulders except for taxiways H and J leading to the AZ, which are only 40 feet wide (Little Rock AFB 2004).

Controlled airspace has been established in the region to manage air traffic. Class C airspace extends in a 10-nautical mile (NM) radius circle around Little Rock National Airport, and Class D airspace extends in a 5-NM radius circle around Little Rock AFB. Little Rock National's Class C and Little Rock AFB's Class D airspace overlap in the southeast through southwest quadrants. However, agreements between the two ATC facilities ensure altitude separation.

ATC at Little Rock AFB is provided by the following agencies:

- Memphis Air Route Traffic Control Center (ARTCC) (ZME)
- Little Rock Approach Control (LIT)
- Little Rock AFB Control Tower (LRF)

Aircraft flying under instrument flight rules (IFR) at greater than 15,000 feet above mean sea level (MSL) are controlled by Memphis Center. LIT approach control provides approach and departure control services to aircraft within approximately a 30 NM radius of LIT very high frequency omni-directional range/tactical air navigation (VORTAC) up to and including 15,000 feet MSL. LRF tower is responsible for providing ATC service to pilots operating under visual flight rules (VFR) within the Little Rock AFB Class D Airspace.

LIT provides basic radar service to all aircraft transitioning Little Rock AFB. This service consists of safety alerts, traffic advisories, limited radar vectoring when requested by the pilot,

and sequencing VFR traffic with IFR and other participating VFR traffic (Little Rock AFB 2004).

4.2.1.2 Drop Zones

Restricted Area R-2403 A/B

R-2403 A/B is located 5 to 9 miles west of Little Rock AFB and can be active up to 16,000 feet MSL. The Department of the Adjutant General of the Arkansas Army National Guard controls R-2403A/B. Notices to Airmen (NOTAMs) concerning R-2403A or B are found in the Enroute Special Notice section under Memphis ARTCC (Little Rock AFB 2004).

Jacksonville Drop Zone (Jax DZ)

Jax DZ is located on the Little Rock AFB airfield primarily north of the runway and west of the AZ. The DZ consists of two separately-surveyed DZs, one for use during inclement weather airdrops (Jax SKE DZ) and another for visual airdrops (Jax Vis DZ). The Jax SKE DZ is 7,350 feet long and 3,000 feet wide. The Jax Vis DZ is 13,500 feet long and 2,100 feet wide (Little Rock AFB 2004).

All-American DZ/Landing Zone (LZ)

This complex is supported by the Restricted Airspace R-2403A, west of Little Rock AFB. The DZ is 5,808 feet long and 3,600 feet wide. The LZ runway is 3,900 feet long and 60 feet wide (Little Rock AFB 2003).

Black Jack DZ

Black Jack DZ is located 19 miles north-northeast of Little Rock AFB. The DZ is 4,290 feet long and 3,000 feet wide (Little Rock AFB 2003).

4.2.1.3 Training Routes

Transit between Little Rock AFB and the training areas employs use of SRs. Several of the Little Rock AFB SRs do not serve local DZs. These SRs allow low altitude flight training to either Fort Chaffee, Arkansas, or Fort Campbell, Kentucky. Flight on SRs is limited to a maximum altitude of 1,500 feet above ground level (AGL) and a maximum speed of 250 NM per hour (knots). SRs are not categorized as military training routes (MTRs) (DoD 2005).

4.2.2 AVIATION RESOURCE CAPABILITY

4.2.2.1 Airfield Capability

The capability of an airfield can be described by its throughput rate. Throughput rate is the maximum number of operations that can take place within a given time period. Operations considered include arrivals, departures, and closed patterns.

Many factors determine an airfield's capability (e.g., the number and types of runways, availability of taxiways, the availability and capability of land-side support facilities to cycle aircraft, and the numbers and types of aircraft operating at the facility). In order to assess these factors, the Federal Aviation Administration (FAA) has developed several models. These are used in the civilian sector for airport planning. However, they are also frequently used by the military to determine airfield capability at their installations.

For this analysis, runway capability has been assessed using guidance in FAA Advisory Circular 150/5060-5, *Airport Capacity and Delay*. Two different methods have been employed that evaluate capability in general and then specific terms. The first is applicable to long-term planning, is somewhat generalized, and considers factors for all elements that can influence airfield capability. The second is more detailed and specific, and focuses on individual elements of the capability of Little Rock AFB's runway.

Long Term Planning

The assessment for long-term planning considers the mix of aircraft classes, and the ratio of aircraft in each class operating from the airfield. Aircraft are classified by their maximum takeoff weight and the number of engines. This calculated "mix-index" is then applied to FAA-developed standard nominal values which consider the applicable runway configuration. For Little Rock AFB, this is a single runway. FAA developed standard output from this assessment provides annual service volume (capability) per year, and the number of operations per hour that can be conducted under Visual Meteorological Conditions (VMC) and Instrument Meteorological Conditions (IMC). These factors can then be compared with expected demand to assess the "capability consumed" by a given level of operations. Table 4.2-1 summarizes the assessment for annual conditions, and Table 4.2-2 shows similar data for operations per hour that could be conducted under VMC or IMC conditions. The capability used and remaining is the ratio between the annual service volume/hourly capability (FAA standard levels) and the annual demand/operations per hour expected (estimate of total operations performed at the airfield). It should be noted that data in Table 4.2-2 reflect a range of values. VMC and IMC would be mixed; neither would exist all of the time. Therefore, actual capability would fall somewhere between the two values.

Table 4.2-1. Total Operations: Current Versus Capability -- Comparison of Annual Capability and Annual Demand

LRAFB Operations	*Annual Service Volume*[1]	*Annual Demand*	*Capability Used/Remaining*
Current	210,000	116,600[2]	55 %/45 %
Capability(39 additional C-130 aircraft)	210,000	173,900[3]	83 %/17 %

Notes: 1. Source: U.S. Department of Transportation FAA 1983
2. Source: Little Rock AFB 2005 (based on 75 primary assigned aircraft [PAI] and 10 backup aircraft inventory [BAI]).
3. Reflects a C-130 aircraft fleet expansion from 78 to 117 aircraft.

Table 4.2-2. Current Versus Capability -- Estimated Airfield Capacities Under Varying Weather Conditions

LRAFB Operations	*Operations per Hour Capability* [1]	*Operations per Hour Expected*	*Capability Used/Remaining*
VMC Conditions			
Current	55	28[2]	51 %/49 %
Capability (39 additional C-130 aircraft)	55	42[3]	76 %/24 %
IMC Conditions			
Current	53	28[2]	53 %/47 %
Capability (39 additional C-130 aircraft)	53	42[3,4]	79 %/21 %

Notes: 1. Source: U.S. Department of Transportation FAA 1983
2. Source: Little Rock AFB 2005
3. Reflects a C-130 aircraft fleet expansion from 78 to 117 aircraft.

As illustrated above, application of the FAA's long-range planning methodology indicates sufficient capability for potential planned and further expansion of operations at the airfield. However, as previously stated, these assessments use nominal values for the many factors that influence an airfield's capability. Many of these factors involve air-side facilities (e.g., runways, taxiways, etc.) as well as land-side supporting facilities dealing with the handling and processing of aircraft and deplaning/emplaning of passengers at a civil facility. These land-side considerations are not applicable for Little Rock AFB. However, specific calculations involving the runway component are applicable.

Runway Capability

The FAA guidance in Advisory Circular 150/5060-5 provides methodology to specifically model the throughput capability for the runway. However, more specific data pertaining to specific types of operations and availability of taxiways is used than for the long-range planning addressed above.

Table 4.2-3 shows the modeled hourly capability of Little Rock AFB's runway under IMC and VMC. This capability is then assessed in relation to the estimated demand that would exist with an increase of 39 C-130 aircraft.

Table 4.2-3. Estimated Runway Capability after Capability Build-up

Weather Condition	*Hourly Capability*[1]	*Hourly Demand*[2]	*Capability Used/Remaining*
VMC	65	42	64%/36%
IMC	43	42	97%/3%

Notes: 1. Source: U.S. Department of Transportation FAA 1983
2. Source: Little Rock AFB 2005 (Current Operations plus 50 percent increase in based-C-130 operations)

As shown in Table 4.2-3, after the increase in aircraft, even if all of the average planned operations are conducted under the most demanding conditions (IMC), the airfield still has a small unused capability. However, it should be noted that the calculated 97 percent capability consumed is conservative. Under severe IMC conditions, some operations would be cancelled or curtailed. Thus, the runway's capability would not necessarily be stressed at the indicated levels.

4.2.2.2 Military Training Airspace

The increased number of C-130 sorties estimated with an increase of 39 aircraft could, under certain circumstances, stress the availability of required military training airspace. Currently, the AADZ is used for airdrops two days per week on Tuesday and Thursday. On Monday, Wednesday, and Friday, BJDZ is utilized for airdrops while AALZ is utilized for unimproved surface assault landing training and as a tool to alleviate traffic pattern saturation at the LRAFB AZ.

There are circumstances that can impact the availability of these military training airspace resources. Operations on AADZ and BJDZ cannot be run concurrently due to DZ proximity (which involves airspace deconfliction, Air Traffic Control management, and safety) and DZ support contract staffing. These considerations can result in limited DZ availability (Time-on-Target [TOT]) for scheduled operations at some times.

As assigned aircraft and aircrews increase, demands on these resources will also increase. While the issues identified above would not cause impacts on a daily basis, nor even preclude the assignment of an additional 39 aircraft at Little Rock AFB, they should be considered. There are management actions that could be considered to minimize these issues. For example, a normal flight usually consists of a 2-ship or 4-ship formation. However, flights have been increased to 6-ship formations, which would increase aircrew training availability. Also, alternative DZs in the region could be utilized. However, there is a cost associated with this alternative. It would involve increased flight time, and costs associated with DZ clean-up since all airdrop-product must be collected and transported back to Little Rock AFB.

While the overall airfield and airspace assets are generally physically able to accommodate the increased number of C-130 operations, environmental noise created from this expansion is also an important factor to consider. This is addressed below.

4.2.3 SUMMARY AND CONCLUSIONS

As shown, the airfield at Little Rock AFB is capable of supporting the increased operations that would be associated with an increase of 39 aircraft. This analysis has shown that there is excess capability of aviation resources for Little Rock AFB, as applicable to both FAA's long-term planning and facility-specific (Little Rock AFB) considerations. Although this excess capability is somewhat constrained under IMC conditions under the facility-specific assessment, it nevertheless does exist, and would not be expected to be a limiting factor.

4.3 ENVIRONMENTAL NOISE

4.3.1 INTRODUCTION

Noise is considered to be unwanted sound that interferes with normal activities or otherwise diminishes the quality of the environment. The word "metric" is used to describe a standard of measurement. As used in environmental noise analysis, there are many different types of noise metrics. Each has a different physical meaning or interpretation. The values depicted in these metrics incorporate a common factor. The frequency of sound is measured in cycles per second, or hertz (Hz). This measurement reflects the number of times per second the air vibrates from the acoustic energy. Low frequency sounds are heard as rumbles or roars, and high frequency sounds are heard as screeches. Sound measurement is further refined through the use of "A-weighting." The normal human ear can detect sounds that range in frequency from about 20 Hz to 15,000 Hz. However, all sounds throughout this range are not heard equally well. Therefore, through internal electronic circuitry, some sound meters are calibrated to emphasize frequencies in the 1,000 to 4,000 Hz range. The human ear is most sensitive to frequencies in this range, and

sounds measured with these instruments are termed "A-weighted," and are shown in terms of A-weighted decibels (dBA). The metrics associated with this assessment are described below.

Day-Night Average Sound Level

This metric, identified as L_{dn}, is the most commonly used. Normally, it is used to assess aircraft operations around an airport. It sums the individual noise events and averages the resulting level over a specified length of time. Thus, it is a composite metric representing the maximum noise levels, the duration of the events, the number of events that occur, and the time of day during which they occur. This metric adds 10 decibels (dB) to those events that occur between 10:00 p.m. and 7:00 a.m. to account for the increased intrusiveness of noise events that occur at night when ambient noise levels are normally lower than during the day time. This cumulative metric does not represent the variations in the sound level heard. Nevertheless, it does provide an excellent measure for comparing environmental noise exposures when there are multiple noise events to be considered.

Public annoyance is the most common concern associated with exposure to elevated noise levels. When subjected to L_{dn} levels of 65 dBA, approximately 12 percent of the persons so exposed will be "highly annoyed" by the noise. At levels below 55 dBA, the percentage of annoyance is substantially lower (less than three percent), and at levels above 70 dBA, it is substantially higher (greater than 25 percent) (Finegold et al. 1994).

Onset Rate-Adjusted Monthly Day-Night Average Sound Level

This metric is a subset of the L_{dn} metric. To account for the random and often sporadic nature of military flight training activities in special use airspace, some of the computer programs developed by the USAF to calculate noise levels created by these activities base their calculations on a monthly, rather than a daily, period. Additionally, to consider some of the unique aspects of noise created by low altitude, high-speed flight of military aircraft, up to 11 dBA may be added to the calculated noise levels to account for the rapid onset rate of the noise. This sound measurement metric is termed the Onset-Rate Adjusted Monthly Day-Night Average Sound Level, L_{dnmr}. Disregarding the onset-rate adjustment for a moment, it should be noted that arithmetically, calculations of L_{dnmr} will yield the same result as calculations of L_{dn}, as long as the numbers of sound events, or aircraft operations considered, are normalized to monthly as opposed to daily rates.

L_{dn} metrics are the preferred noise metrics of the Department of Housing and Urban Development, the Department of Transportation, the FAA, the U.S. Environmental Protection Agency (USEPA), and the Veteran's Administration. While L_{dn} does provide a single measure of overall noise impact, it is fully recognized that it does not provide specific information on the

number of noise events or the specific individual sound levels which do occur. For example, an L_{dn} of 65 dB could result from a very few noisy events, or a large number of quieter events. Although it does not represent the sound level heard at any one particular time, it does represent the total sound exposure. Scientific studies and social surveys have found the L_{dn} to be the best measure to assess levels of community annoyance associated with all types of environmental noise. Therefore, its use is endorsed by the scientific community and governmental agencies (American National Standards Institute 1980, 1988; USEPA 1974; Federal Interagency Committee on Urban Noise 1980; Federal Interagency Committee on Noise 1992).

Finally, it should be noted that ambient background noise is not considered in the aircraft noise calculations that are presented below. There are two reasons for this. First, ambient background noise, even in wilderness areas, varies widely, depending on location and other conditions. For example, studies conducted in an open pine forest in the Sierra National Forest in California have measured up to a 10 dBA variance in sound levels simply due to an increase in wind velocity (Harrison 1973). Therefore, assigning a value to background noise would be arbitrary. Secondly, and probably most important, is that it is reasonable to assume that ambient background noise in the project's region of influence would have little or no effect on the calculated L_{dn}. In calculating noise levels, louder sounds dominate the calculations, and overall, aircraft noise would be expected to be the dominant noise source characterizing the acoustic conditions in the region.

Using measured sound levels as a basis, the USAF developed several computer programs to calculate noise levels resulting from aircraft operations. Sound levels calculated by these programs have been extensively validated against measured data, and have been proven to be highly accurate.

4.3.2 AIRFIELD NOISE

The following terms are defined to provide a better understanding of how data are developed for input to the noise models used to calculate noise. Around an airfield, *aircraft operations* are categorized as takeoffs, landings, or closed patterns (which could include activities referred to as touch-and-gos or low approaches). Each takeoff or landing constitutes one operation. A *closed pattern* occurs when the pilot of the aircraft approaches the runway as though planning to land, but then applies power to the aircraft and continues to fly as though taking off again. The pilot then flies a circular or rectangular track around the airfield, and again approaches for landing. In some cases the pilot may actually land on the runway before applying power, or in other cases the pilot simply approaches very close to the ground. In either event, since a closed pattern operation essentially consists of a landing and a takeoff, it is considered two operations.

During FY 2005, Little Rock AFB supported approximately 116,600 aviation operations. This equates to approximately 448 daily operations (Little Rock AFB 2005). Considering all types of flight activities, a scenario representing an "average day's" operations was developed. The operations considered include arrivals (landings), departures (takeoffs), and closed patterns. Noise calculations consider the frequency of flight operations, runway utilization, and the flight tracks and flight profiles flown by each aircraft.

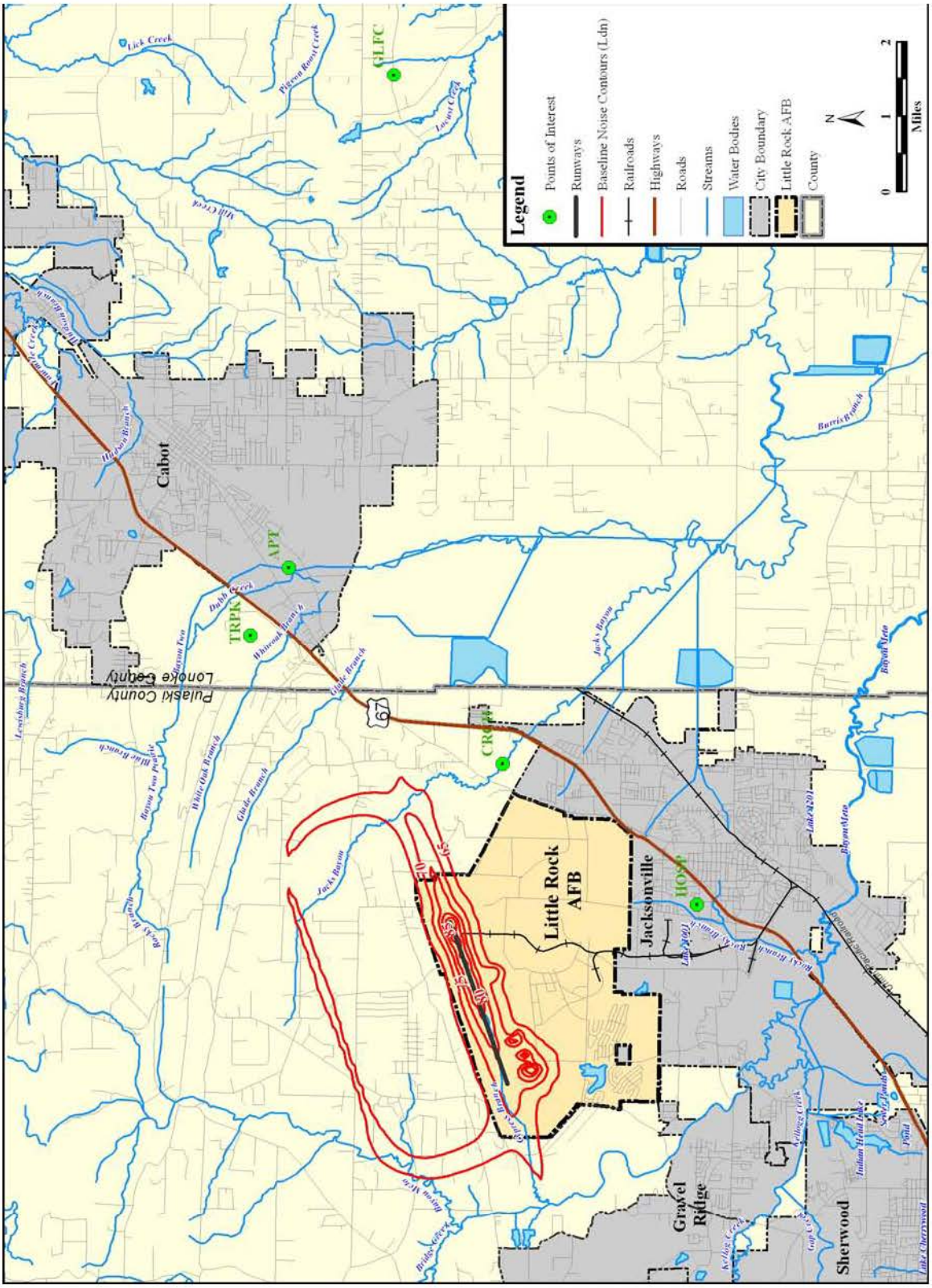
These levels and types of activity are then combined with information on climatology, maintenance activities, and aircraft flight parameters, and processed through the USAF's BASEOPS/NOISEMAP (Moulton 1990) computer models to calculate L_{dn}. Once noise levels are calculated, they are plotted on a background map in 5-dB increments from 65 dBA to 85 dBA, as applicable. Noise contours associated with current activities at Little Rock AFB are shown in Figure 4.3-1. Contours associated with an increase of 39 C-130 aircraft are shown in Figure 4.3-2, and the 65 L_{dn} contours for the two conditions are compared in Figure 4.3-3. The land areas (in acres) encompassed by each contour for each condition are compared in Table 4.3-1.

Overall, with an increase of 39 aircraft, land area exposed to elevated noise levels would increase by 1,935.4 acres, a 63 percent increase.

In order to further assess noise exposure from aviation activity, several locations around the base were selected for specific analysis. These points represent land uses that could be potentially sensitive to elevated noise levels.

The points represent:

- APT = Apartment Housing
- CRCH = A Church
- GLFC = A Golf Course
- HOSP = A Hospital
- TRPK = A Trailer Park


Legend
Points of Interest
Runways
Baseline Noise Contours (Ldn)
Railroads
Highways
Roads
Streams
Water Bodies
City Boundary
Little Rock AFB
County
N
0
1
2
Miles
Cabot
Pulaski County
Lonoke County
Little Rock AFB
Jacksonville
Gravel Ridge
Sherwood
GLFC
APT
TRPK
CRGH
HOSP
65
70
75
80
85
Lick Creek
Pigeon Roost Creek
Lower Creek
Mill Creek
Hudson Branch
Burris Branch
Dubb Creek
Whitewash Branch
Glade Branch
Jacks Bayou
Bayou Meto
Lake 2001
Lake 2002
Lake 2003
Lake 2004
Lake 2005
Lake 2006
Lake 2007
Lake 2008
Lake 2009
Lake 2010
Lake 2011
Lake 2012
Lake 2013
Lake 2014
Lake 2015
Lake 2016
Lake 2017
Lake 2018
Lake 2019
Lake 2020
Lake

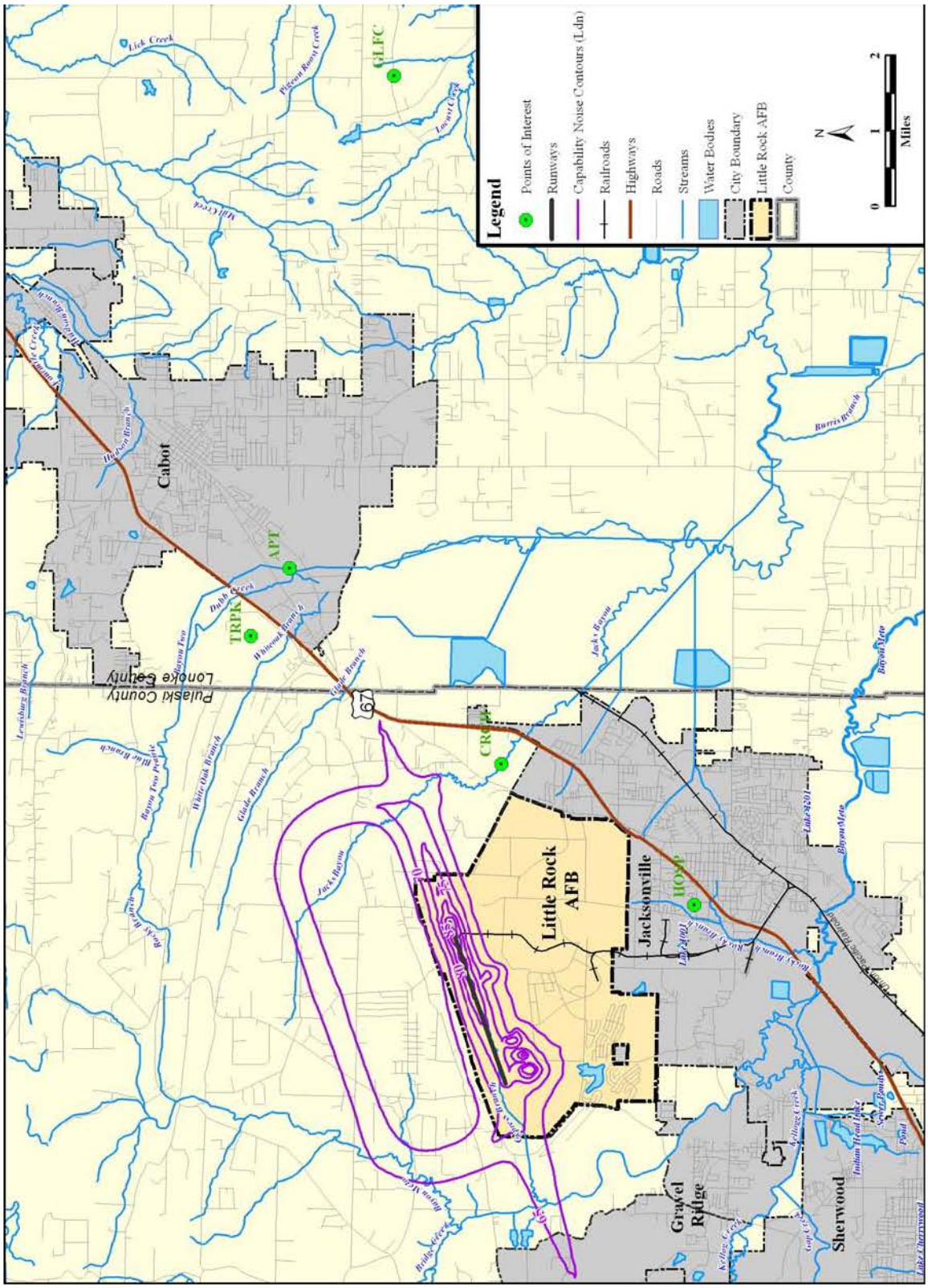


Figure 4.3-2. Noise Contours with Additional 39 C-130 Aircraft (Capability)

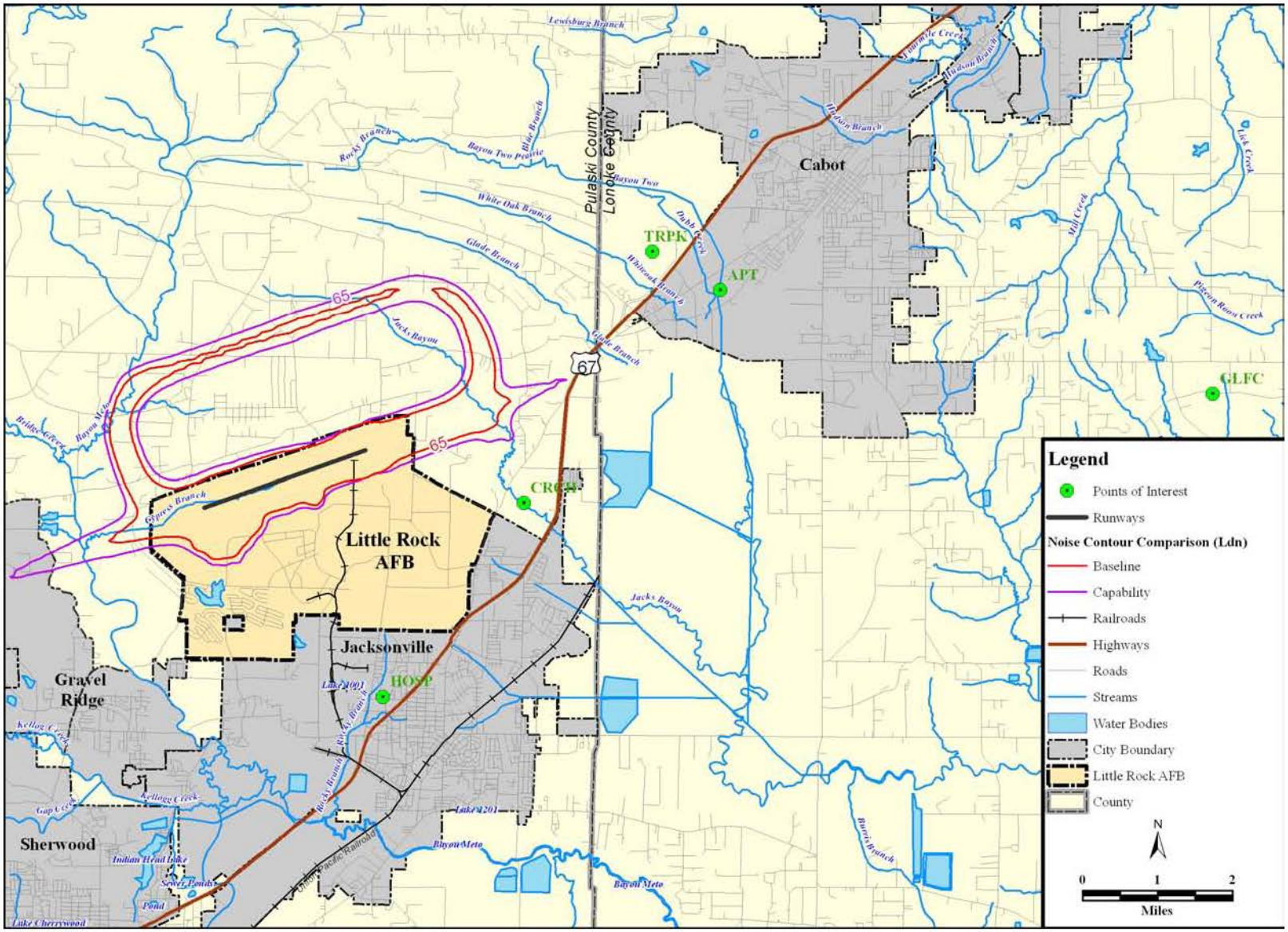


Figure 4.3-3. Comparison of Existing Contours with Capability Contours

Table 4.3-1. Land Areas Exposed To Elevated Noise Levels

Noise Level (Ldn)	*Current Acres*	*Capability Acres*	*Area Change*	*Percent Change*
65 – 70	1,984.8	3,513.4	+ 1,528.6	+ 77%
70 – 75	672.1	846.6	+ 174.5	+ 26%
75 – 80	246.8	423.6	+ 176.8	+ 72%
80 – 85	117.7	149.8	+ 32.1	+ 27%
> 85	29.4	52.7	+ 23.3	+ 79%

Source: Wasmer and Maunsell 2002

Noise exposure at these points is shown in Table 4.3-2, and is assessed relative to an assumed capability of 65 L_{dn} (the commonly accepted level for the most sensitive land uses). Since noise levels are logarithmically-based, they can not be assessed using standard arithmetic calculations. Each noise level must be stated in terms of acoustic energy. This is performed by calculating 10 raised to the power of the noise level divided by 10 ($10^{[\text{Noise Level}/10]}$). So, for example, at point APT, the noise level is 54.8 L_{dn}. This equates to $10^{54.8/10}$, or 301995.172 units of acoustic energy. The assumed maximum desirable noise level is 65 L_{dn}, which equates to 3162277.66 units of acoustic energy. Using these values of acoustic energy, the ratio of capability consumed can then be calculated using standard arithmetic division. The location of the points is depicted in Figures 4.3-1 through 4.3-3.

Table 4.3-2. Specific Point Noise Levels
Increase of 39 Aircraft vs. Assumed Capability of 65 Ldn

Point	*Capability(39 Additional Aircraft) L_{dn}*	*Capability (in L_{dn}) (Assumed maximum desirable level)*	*Capability Consumed (In Percent Relative to 65 L_{dn})*
APT	54.8	65.0	10%
CRCH	62.0	65.0	50%
GLFC	35.0	65.0	0%
HOSP	44.1	65.0	1%
TRPK	45.7	65.0	1%

Source: Moulton 1990

As shown, although land area exposed to elevated noise levels increases under the increase of 39 aircraft, identified specific sensitive noise receptors still remain below the threshold of 65 L_{dn}.

4.3.3 MILITARY TRAINING AIRSPACE NOISE

Using the USAF's program MR_NMAP, which is specifically designed to consider the unique aspects of flight within elements of military training airspace, the maximum noise levels along

the centerline of specific aircraft tracks were calculated. These levels are shown in terms of L_{dnmr}. SRs are corridors described by a center line, with lateral extensions on either side of that centerline. However, studies have shown that aircrews do not always follow a specific ground track when using the SR. Instead, observed flight tracks occur dispersed on either side of the centerline, in a manner that approximates a standard normal distribution based on the route width. As route width increases on either side of the route centerline, the standard deviation associated with the distribution around the centerline increases. Thus, as route width increases, noise on the centerline decreases.

The values presented in Table 4.3-3 reflect the mathematically calculated output of the MR_NMAP model. However, background noise in rural areas is normally considered to be approximately 40 dBA or greater. Therefore, although a value is calculated, any such value equal to, or less than 35 to 40 dBA essentially indicates that there is little or no observable noise contribution from aircraft in the region. These low values are due to the size of the airspace, the relatively limited number of operations, and the altitudes at which these operations are conducted. The potential capability of the airspace to support increased operations is assessed using a standard of 55 L_{dnmr}. This accommodates a consideration of normally lower ambient noise levels in rural areas as opposed to urban areas. Furthermore, this is a level at which public annoyance is expected to be minimal.

Table 4.3-3. Slow Route Capability Assessment

Route	*Current Noise Level (In L_{dnmr})*	*Noise Level with 39 Additional Aircraft (In L_{dnmr})*	*Capability Consumed (In Percent Relative To 55 L_{dnmr})*
219A	39.6	41.7	4.7
219B	40.7	42.9	6.1
220A	46.2/47.7	48.3/49.8	21.5/30.4
220B	47.8	49.9	31.1
229A	32.9/34.4	35.1/36.6	1.0/1.4
229B	35.3/36.8/37.6	37.5/39.0/39.8	1.8/2.5/3.0
230A	29.3/30.8	31.3/32.8	0.4/0.6
230C	24.7/27.0	27.3/29.6	0.2/0.3
231A	32.2/33.7	34.3/35.8	0.8/1.2
231B	34.9/37.2	37.0/39.3	1.6/2.7
232A	44.7/46.2	46.8/48.3	15.1/21.3
232B	45.9	48.0	20.0
246A	36.9/38.4	39.0/40.5	2.5/3.5
246B	37.9	40.0	3.2

Note: While the majority of the SRs have a route width of 10 NM, segments of some are reduced to 4 and 7 NM. Multiple data entries in Table 4.3-3 reflect these varied route widths (DoD 2005).
Source: Lucas and Calamia 1996

The calculation of "capability consumed" is based on the same methodology discussed in Section 4.3.2 (noise exposure is assessed relative to an assumed capability of 65 $L_{dn,}$ and the using values of acoustic energy, the ratio of capability consumed can then be calculated). As shown, noise levels under the SRs are not a limiting factor with the increased activity level associated with 39 additional C-130 aircraft.

Noise associated with the use of the AADZ and the BJDZ was assessed using analogous techniques. Aircraft flight over the DZ during an air drop is much more constrained laterally than along an SR. Therefore, using the USAF's MR_NMAP, a track with a width of zero NM was modeled using the altitude associated with each of the DZs. The noise levels associated with the DZs are shown in Table 4.3-4. To provide a conservative assessment, these levels were evaluated using a threshold capacity of 65 L_{dnmr}. However, in considering the capability against this threshold, it should be noted that land areas associated with DZs are routinely exposed to elevated noise levels, and these levels are not incompatible with the current land use.

Table 4.3-4. Drop Zone Capability Assessment

DZ	*Current Noise Level (In L_{dnmr})*	*Noise Level with 39 Additional Aircraft (In L_{dnmr})*	*Capability Consumed (In Percent Relative To 65 L_{dnmr})*
AADZ	62.6	64.6	92
BJDZ	63.9	66.0	127

Source: Lucas and Calamia 1996

As indicated, noise levels on BJDZ exceed the threshold used (65 L_{dnmr}) associated with an increase of 39 C-130 aircraft. However, it should be noted that the flight track is extremely constrained in width, and these levels indicate the noise along the centerline of the track. Using the methodology employed in the USAF's ROUTEMAP program, the lateral attenuation of noise on either side of the center line can be calculated considering the width of the track. These calculations show that on BJDZ, noise levels drop below 55 L_{dnmr} at approximately 1,500 feet off-set from the track (Bradley 1996). Since BJDZ is 3,000 feet wide, excessively elevated noise levels would not be expected to emanate off-site. Anticipated noise associated with use of the DZs would not be expected to be a limiting factor for the increased operations associated with the additional 39 aircraft.

4.3.4 SUMMARY AND CONCLUSIONS

As detailed above, noise levels associated with an increase of 39 aircraft, an approximately 50 percent increase in C-130 operations, on and at specific points around the airfield, and in the applicable military training airspace do not exceed normally accepted standards of 65 L_{dn}. Excess noise in any of the areas assessed would be considered a limiting factor to an increase in aircraft.

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APPENDIX A
LAND USE FACTORS AND CALCULATIONS FOR PROJECTS BUILDINGS AND PAVEMENTS

Estimate of Interior Building Space and Impervious Surfaces
Using Derived Factors for Impervious Cover, Building Space, and Floors

Little Rock AFB

Little Rock AFB Developable Land and Potential Build Out Factors

Land Use Type	Developable Acreage	Revised Building Space Factor**	New Building Space (FT2)	Revised Floors Factor	Aggregate Footprint (AC)	Revised Impervious Factor**	New Impervious Cover (AC)	Aggregate Pavements (AC)	Authorized SF/Person	Population Supported	Parking Spaces
ADMINISTRATIVE	158.8	0.10	719,795	1.1	15.0	0.60	96.0	81.0	180	3,999	2,399
AIRCRAFT_OPERATIONS_MAINTENANCE	81.5	0.15	527,011	1.0	12.1	0.61	50.1	38.0	500	1,054	401
AIRFIELD	46.0	0.00	-	-	-	0.51	23.4	23.4	0	-	
CLEARZONE	0.0	0.00	-	-	-	0.00	0.0	0.0	0	-	
COMMUNITY_COMMERCIAL	28.3	0.12	153,928	1.0	3.5	0.71	20.1	16.6	1000	154	616
COMMUNITY_SERVICE	31.2	0.15	202,187	1.2	3.9	0.53	16.4	12.5	500	404	809
HOUSING_ACCOMPANIED	51.0	0.19	429,925	1.0	9.9	0.39	19.7	9.8	450	955	478
HOUSING_UNACCOMPANIED	23.2	0.22	219,686	2.0	2.5	0.59	13.8	11.2	132	1,664	166
INDUSTRIAL	225.4	0.04	351,818	1.0	8.1	0.29	65.8	57.7	750	469	178
MEDICAL	3.2	0.25	35,298	1.3	0.6	0.66	2.1	1.5	0	-	
OPEN_SPACE	206.8	0.001	10,001	1.0	0.2	0.03	6.1	5.8	0	-	
OUTDOOR_RECREATION	496.9	0.00003	554	1.0	0.01	0.13	64.4	64.4	0	-	
TRAINING	170.2	0.10	366,586	1.1	7.7	0.54	45.8	38.1	100	3,666	2,200
WATER	0.0	0.00	-	-	-	0.00	0.0	0.0	0	-	
TOTAL	1522.6	NA	3,016,790	NA	63.5	NA	423.6	360.1	NA	12,366	7,246

Factors Derived from USAF 1994

	sf auth.	parking/person
Admin	180	0.6
Training-ind	100	0.6
Dinning Hall	25	0.09
Dorm PP	475	0.7
Dorm Basic	132	0.1
Industrial	750	0.38
Houses	450	0.5
Training-out		
Community Service**	500	2
Community Commercial**	1000	4
Aircraft ops & maint	500	0.38

**Numbers include customers with employees but assigns space and parking by the worker. Typical PX is 5000 sf, 5 employees, 20 spaces.

Development of Building and Floors Factors

Little Rock AFB

Building Interior Space		
Sum of areainside	areas_u_d	
LAYER	FT2	Grand Total
ADMINISTRATIVE	297581	297581
AIRFIELD_OPERATIONS_MAINTENANCE	1165836	1165836
COMMUNITY_COMMERCIAL	377431	377431
COMMUNITY_SERVICE	121142	121142
HOUSING_ACCOMPANIED	2919886	2919886
HOUSING_UNACCOMPANIED	566562	566562
INDUSTRIAL	656672	656672
MEDICAL	149574	149574
OPEN_SPACE	159182	159182
OUTDOOR_RECREATION	196340	196340
TRAINING	352981	352981
Grand Total	6963186	6963186

Current Land Use and Interior Building Space for Developed Areas

Land Use Type	Floor Space (acres)	Gross Acreage	Gross Building Space Factor	Developed Acreage*	Revised Building Space Factor**
ADMINISTRATIVE	6.8	71.7	0.10	65.6	0.10
AIRCRAFT_OPERATIONS_MAINTENANCE	26.8	186.6	0.14	180.3	0.15
AIRFIELD	0.0	735.6	0.00	735.6	0.00
CLEARZONE	0.0	413.2	0.00	413.2	0.00
COMMUNITY_COMMERCIAL	8.7	69.5	0.12	69.5	0.12
COMMUNITY_SERVICE	2.8	18.7	0.15	18.7	0.15
HOUSING_ACCOMPANIED	67.0	346.7	0.19	346.7	0.19
HOUSING_UNACCOMPANIED	13.0	69.5	0.19	59.8	0.22
INDUSTRIAL	15.1	420.8	0.04	420.8	0.04
MEDICAL	3.4	13.5	0.25	13.5	0.25
OPEN_SPACE	3.7	3290.8	0.001	1328.0	0.001
OUTDOOR_RECREATION	4.5	423.6	0.01	415.8	0.00003
TRAINING	8.1	90.0	0.09	82.0	0.10
WATER	0.0	42.7	0.00	42.7	0.00
TOTAL	1079.0	6192.9	0.17	4198.2	NA

* Developed acreage excludes parcels approximately 3 acres or larger in size identified as empty and developable based on current land
** Revised building space factor is based on developed acreage, except for open areas.

Building Interior Space and Aggregate Number of Floors by Land Use				Gross Floors Factor	Revised Floors Factor
		areas_u_d			
LAYER	Data	FT2	Grand Total		
ADMINISTRATIVE	Sum of areagndcov	260559	260559	1.1	1.1
	Sum of areainside	297581	297581		
AIRFIELD_OPERATIONS_MAINTENANCE	Sum of areagndcov	1147571	1147571	1.0	1.0
	Sum of areainside	1165836	1165836		
COMMUNITY_COMMERCIAL	Sum of areagndcov	385949	385949	1.0	1.0
	Sum of areainside	377431	377431		
COMMUNITY_SERVICE	Sum of areagndcov	97515	97515	1.2	1.2
	Sum of areainside	121142	121142		
HOUSING_ACCOMPANIED	Sum of areagndcov	2898802	2898802	1.0	1.0
	Sum of areainside	2919886	2919886		
HOUSING_UNACCOMPANIED	Sum of areagndcov	288145	288145	2.0	2.0
	Sum of areainside	566562	566562		
INDUSTRIAL	Sum of areagndcov	723681	723681	0.9	1.0
	Sum of areainside	656672	656672		
MEDICAL	Sum of areagndcov	114207	114207	1.3	1.3
	Sum of areainside	149574	149574		
OPEN_SPACE	Sum of areagndcov	154762	154762	1.0	1.0
	Sum of areainside	159182	159182		
OUTDOOR_RECREATION	Sum of areagndcov	227723	227723	0.9	1.0
	Sum of areainside	196340	196340		
TRAINING	Sum of areagndcov	322790	322790	1.1	1.1
	Sum of areainside	352981	352981		
Total Sum of areagndcov		6621704	6621704		
Total Sum of areainside		6963186	6963186		

Development of Land Use
Impervious Surfaces Factor

Little Rock AFB

Building Footprint

Sum of areagndcov	areas_u_d	
LAYER	FT2	Grand Total
ADMINISTRATIVE	260559	260559
AIRFIELD_OPERATIONS_MAINTENANCE	1147571	1147571
COMMUNITY_COMMERCIAL	385949	385949
COMMUNITY_SERVICE	97515	97515
HOUSING_ACCOMPANIED	2898802	2898802
HOUSING_UNACCOMPANIED	288145	288145
INDUSTRIAL	723681	723681
MEDICAL	114207	114207
OPEN_SPACE	154762	154762
OUTDOOR_RECREATION	227723	227723
TRAINING	322790	322790
Grand Total	6621704	6621704

Misc Vehicle Areas

Sum of area_size	area_u_d	
LAYER	FT2	Grand Total
ADMINISTRATIVE	86787	86787
AIRFIELD_OPERATIONS_MAINTENANCE	1937132	1937132
COMMUNITY_COMMERCIAL	121850	121850
COMMUNITY_SERVICE	61078	61078
HOUSING_ACCOMPANIED	24693	24693
HOUSING_UNACCOMPANIED	49845	49845
INDUSTRIAL	2383060	2383060
MEDICAL	15477	15477
OPEN_SPACE	702840	702840
OUTDOOR_RECREATION	143693	143693
TRAINING	99513	99513
Grand Total	5625968	5625968

Vehicle Driveways

paved_d	PAVED

Sum of area_size	area_u_d	
LAYER	FT2	Grand Total
ADMINISTRATIVE	39994	39994
AIRFIELD_OPERATIONS_MAINTENANCE	152808	152808
COMMUNITY_COMMERCIAL	139164	139164
COMMUNITY_SERVICE	39899	39899
HOUSING_ACCOMPANIED	741785	741785
HOUSING_UNACCOMPANIED	119156	119156
INDUSTRIAL	50637	50637
MEDICAL	1745	1745
OPEN_SPACE	146369	146369
OUTDOOR_RECREATION	232083	232083
TRAINING	64861	64861
Grand Total	1728502	1728502

Roads

paved_d	PAVED

Sum of area_size	area_u_d	
LAYER	FT2	Grand Total
ADMINISTRATIVE	275371	275371
AIRFIELD_OPERATIONS_MAINTENANCE	316514	316514
COMMUNITY_COMMERCIAL	147919	147919
COMMUNITY_SERVICE	16715	16715
HOUSING_ACCOMPANIED	1650767	1650767
HOUSING_UNACCOMPANIED	85001	85001
INDUSTRIAL	797192	797192
MEDICAL	27829	27829
OPEN_SPACE	2118775	2118775
OUTDOOR_RECREATION	586546	586546
TRAINING	198976	198976
Grand Total	6221604	6221604

Vehicle Parking

Sum of area_size	area_u_d	
LAYER	FT2	Grand Total
ADMINISTRATIVE	898232	898232
AIRFIELD_OPERATIONS_MAINTENANCE	1153228	1153228
COMMUNITY_COMMERCIAL	1128252	1128252
COMMUNITY_SERVICE	146907	146907
HOUSING_ACCOMPANIED	135349	135349
HOUSING_UNACCOMPANIED	706634	706634
INDUSTRIAL	1279155	1279155
MEDICAL	201075	201075
OPEN_SPACE	933018	933018
OUTDOOR_RECREATION	960382	960382
TRAINING	983177	983177
Grand Total	8525408	8525408

Pedestrian Walks

Sum of area_size	area_u_d	
LAYER	FT2	Grand Total
ADMINISTRATIVE	168372	168372
AIRFIELD_OPERATIONS_MAINTENANCE	120736	120736
COMMUNITY_COMMERCIAL	227842	227842
COMMUNITY_SERVICE	66123	66123
HOUSING_ACCOMPANIED	378721	378721
HOUSING_UNACCOMPANIED	296693	296693
INDUSTRIAL	115843	115843
MEDICAL	27843	27843
OPEN_SPACE	145044	145044
OUTDOOR_RECREATION	193960	193960
TRAINING	250042	250042
Grand Total	1991219	1991219

Bridges

Sum of area_size	area_u_d	
LAYER	FT2	Grand Total
AIRFIELD_OPERATIONS_MAINTENANCE	139	139
OPEN_SPACE	529	529
OUTDOOR_RECREATION	2282	2282
TRAINING	529	529
Grand Total	3479	3479

NOTE:
The data sumarized on this page originated from Little Rock AFB geobase files for buildings, pavements, parking, bridges, and walkways. These features were intersected with the current developed landuse areas and do not account for the recently developed future land use scenario. Airfield pavements are sumarized separately from a geobase file titled airfield_surface_area. Paved surfaces which appeared in the WATER land use category were also excluded from analysis. Areas are rounded to the nearest square foot.

Current Land Use and Impervious Cover for Developed Areas

Land Use Type	Paved (FT2)	Paved (Acres)	Gross Acreage	Gross Impervious Factor	Developed Acreage*	Revised Impervious Factor**
ADMINISTRATIVE	1729315	39.7	71.7	0.55	65.6	0.60
AIRCRAFT_OPERATIONS_MAINTENANCE	4828129	110.8	186.6	0.59	180.3	0.61
AIRFIELD	16282601	373.8	735.6	0.51	735.6	0.51
CLEARZONE	0	0.0	413.2	0.00	413.2	0.00
COMMUNITY_COMMERCIAL	2150975	49.4	69.5	0.71	69.5	0.71
COMMUNITY_SERVICE	428238	9.8	18.7	0.53	18.7	0.53
HOUSING_ACCOMPANIED	5830117	133.8	346.7	0.39	346.7	0.39
HOUSING_UNACCOMPANIED	1545473	35.5	69.5	0.51	59.8	0.59
INDUSTRIAL	5349568	122.8	420.8	0.29	420.8	0.29
MEDICAL	388175	8.9	13.5	0.66	13.5	0.66
OPEN_SPACE	4201337	96.4	3290.8	0.03	1328.0	0.03
OUTDOOR_RECREATION	2346669	53.9	423.6	0.13	415.8	0.13
TRAINING	1919888	44.1	90.0	0.49	82.0	0.54
WATER	0	0.0	42.7	0.00	42.7	0.00
TOTAL	47000485	1079.0	6192.9	0.17	4192.1	NA

* Developed acreage excludes parcels approximately 3 acres or larger in size identified as empty and developable based on current land use.
** Revised impervious factor is based on developed acreage, except for open areas.

APPENDIX B
UTILITY SUMMARY DATA

Analysis of Electricity and Natural Gas Supply Demand Increases Due to Projected Interior Building Spaces

Little Rock AFB

Current Building Area as documented in 26-Oct-2005 Form 7115 (excludes MFH Bld Nos 2000-3000 due to privitization)	*CIP Interior Building Space Added*	*BRAC Interior Building Space Added*	Total Proposed (Excludes CIP and BRAC additions that require demolition)	% Increase
3,732,928	*179,616*	*811,808*	6,319,794	69%
Estimated MFH Housing based on 2005 GEOBASE Data on Building Nos. 2000-3000				
2,809,524	*0*	*0*	3,239,449	15%
Total Estimated Building Space with MFH				
6,542,452	*179,616*	*811,808*	9,559,243	46%

ELECTRICITY SUPPLY & DEMAND ANALYSIS

Little Rock Air Force Base

2005 Fiscal Year **(October 1, 2004 - September 30, 2005 Data Obtained from 314th CES/CEOE)**

MONTH	YEAR	DAYS		ENERGY			DEMAND		DEMAND			POWER	LOAD
				ON PEAK ACTUAL (KWH)	OFF PEAK ACTUAL (KWH)	TOTAL ACTUAL (KWH)	ON PEAK ACTUAL (KW)	OFF PEAK ACTUAL (KW)	ON PEAK ACTUAL (KVA)	OFF PEAK ACTUAL (KVA)	KVAR	FACTOR (%)	FACTOR (%)
ANNUAL													
TOTAL		344		31,546,531	67,986,960	99,533,491	187,844	181,817	192,843	186,412			
AVERAGE		29		2,628,878	5,665,580	8,294,458	15,654	15,151	16,070	15,534		97.6%	78.3%
Per Square-Foot Values ----->				4.82	10.39	15.21	0.0287	0.0278	0.0295	0.0285			
				0.40	0.87	1.27	0.0024	0.0023	0.0025	0.0024			

	Current	Increase	New Value	Units
TOTAL DEMAND	99,533,491	69,102,902	168,636,393	KWH
CAPACITY	394,200,000	394,200,000	394,200,000	KWH
Demand % of Capacity	25%	18%	43%	
Highest Peak Demand	20000	13885	33885	KW
CAPACITY	45000	45000	45000	KW
Demand % of Capacity	44%	31%	75%	

Source of Increase: See below.

Little Rock Air Force Base - Military Family Housing Portion

ANNUAL												
TOTAL		344		36,542	80,098	**116,640**						
AVERAGE		29		3,045	6,675	9,720	1	0	1.0	0.0	97.6%	1445.4%
Per Square-Foot Values ----->				0.013	0.029	0.042						
				0.001	0.002	0.003						

Current	Pop Based Increase	New Value	Units
	179%		
116,640	208,439	325,079	KWH

Source of Increase: Projected Added Effective On-Base Population

Little Rock Air Force Base - Medical Portion

ANNUAL												
TOTAL		344		1,273,859	2,691,509	**3,965,368**						
AVERAGE		29		106,155	224,292	330,447	616	0	632.4	0.0	97.6%	79.1%

Current	SF Based Increase	New Value	Units
	69%		
3,965,368	2,747,944	6,713,312	KWH

Source of Increase: New Estimated Building Floor Space Excluding MFH and Demolition

Little Rock Air Force Base - Base Portion (excluding school)

ANNUAL												
TOTAL		344		30,236,131	65,215,353	**95,451,483**						
AVERAGE		29		2,519,678	5,434,613	7,954,290	15,037	0	15,436.8	0.0	97.6%	78.2%
Per Square-Foot Values ----->				8.100	17.470	25.570						
				0.675	1.456	2.131	0.004		0.004			

Current	SF Based Increase	New Value	Units
	69%		
95,451,483	66,146,520	161,598,003	KWH

Source of Increase: New Estimated Building Floor Space Excluding MFH and Demolition

The base has an annual 394,204,000 kilowatt-hour (KWH) capability based on a 45 megawatt (MW) maximum load for 24 hours a day 365 days a year and a load factor of 100%. (Source: 314th CES/CEOE, October 2005)

NATURAL GAS SUPPLY & DEMAND ANALYSIS

Little Rock Air Force Base

Gas Transmissions between Oct 04 and Sept 05 (Source 314th CES/CEOE)
202,597 MCFY (excludes MFH, MFH not using gas or not tracked by base)
202,597,000 CFY
0.054272946 <---------- Per SF factor (base only)
MCF/SF/YR

Current	SF Based Increase	New Value	Units
	69%		
202,597	140,397	342,994	MCF

Source of Increase: New Estimated Building Floor Space Excluding MFH and Demolition

Pipeline Rated Capacity per ARKLA (1997) (Source: 314th CES/CEOE)
275,000 SCFH 2,409,000,000 SCFY 1 ATM = 14.69594878 PSI
Pressure tested pipe to 60 PSIG

												% Annual Capacity
Operating Pressure Winter	32 deg F	45 PSIG	60 PSIA	202,597,000 CFY	=	827,154,441 SCFY	=	94,424 SCFH	34%
Operating Pressure Summer	85 deg F	20 PSIG	35 PSIA	202,597,000 CFY	=	435,555,653 SCFY	=	49,721 SCFH	18%

Max Month Jan 05 38,365 MCF (Source; 314th CES/CEOE)
31 days
Current Peak 51,566 CFH @ 32 deg F and 45 PSIG
Demand 210,544 SCFH 77% Capacity

Increased demand based on SF additions to Main Base (MFH gas not tracked by base): 69%
Future Peak Demand 356,448 SCFH 130% Capacity
Source of Increase: CIP and BRAC Added Construction (Building Floorspace)

Analysis of Potable Water Sewer Supply and Demand Increases due to Projected Population Increases

Little Rock AFB

Baseline and Projected Population

	Total Population	EP Factor	Effective Population	Distribution Factor	Projected Added Total	Projected Added Effective	Projected New Total	Projected New Effective	% Increase Total	% Increase Effective
Military On-base	1537	1	1537	17%	2577	2577	4114	4114	168%	168%
Dependents On-base	1634	1	1634	18%	2920	2920	4554	4554	179%	179%
Military Off-base	4,204	0.33	1387	46%	4501	1485	8705	2873	107%	107%
Trainees On-Base	35	1	35	0.4%	4	4	39	39	11%	11%
Trainees Off-Base	143	0.33	47	2%	14	5	157	52	10%	10%
Civilian Employees	1,244	0.33	411	14%	124	41	1368	451	10%	10%
Transient Personnel	255	1	255	3%	16	16	271	271	6%	6%
Total	9,052		5,306	100%	10156	7048	19208	12354	112%	133%
Source:	Economic Impact Analysis, 2004; Love, 2005									

Baseline and Projected Potable Water Consumption and Capacity

Estimated Water Consumption	Current	Per Capita	New Projected
Potable Only (gpd)	1,848,000	348	4,302,653
Non-potable reserve (fire water)	1,140,000		1,140,000
Total (gpd)	2,988,000		5,442,653
Current Pump Capacity (gpd)	3,938,400		3,938,400
Surplus or Deficiency (gpd)	**950,400**		**-1,504,253**
Current Contractual Supply (gpd)	5,000,000		5,000,000
Surplus or Deficiency (gpd)	**2,012,000**		**-442,653**
Basis: maximum consumption from 23 August 2003 in gallons with the addition of the entire hangar firewater storage requirement obtained from 314th CEOE.			

Baseline and Projected Sewar System Consumption and Capacity

Estimated Sewer Consumption	Current Annual	Daily (gallons)	Daily Per Capita	Daily Projected	Max Projected	Annual Projected
Total 11/04-10/05 (gallons/yr)	482,964,000	1,323,189	249			
Average Sewer/Water Ratio	1.98					
Min Sewer/Water Ratio	1.01					
Max Sewer/Water Ratio	3.29				1,086,646	
Population Based Sewer (gallons/yr)	244,353,640	669,462	126	3,124,115	3,124,115	1,140,302,075
Average Infiltration Based Sewer (gallons/yr)	238,610,360	653,727		653,727		238,610,360
Total Average Projected (gallons)				3,777,842	4,210,761	1,378,912,435
Max Projected (gallons)						
Max Recorded Daily Flow (2/14/2003)		4,109,000				
Pipeline Rated Capacity (18" line)	2,501,110,447	6,852,357				
Current Contracted Capability (20.47% of 12.1 MGD)	904,057,550	2,476,870				
Contract Based Surplus (Deficit) (not limiting)	421,093,550					-474,854,885
Contract Requirement (gal)	904,057,550				1,536,927,848	1,378,912,435
Contract Requirement (% of 12.1 MGD)	20.47%				34.80%	31.22%

(Source: 314th CES/CEOE and population increases from above table)

APPENDIX C
AIRCRAFT NOISE ANALYSIS AND AIRSPACE OPERATIONS

APPENDIX C
AIRCRAFT NOISE ANALYSIS AND AIRSPACE OPERATIONS

Noise is generally described as unwanted sound. Unwanted sound can be based on objective effects (such as hearing loss or damage to structures) or subjective judgments (community annoyance). Noise analysis thus requires a combination of physical measurement of sound, physical and physiological effects, plus psycho- and socio-acoustic effects.

Section 1 of this appendix describes how sound is measured and summarizes noise impact in terms of community acceptability and land use compatibility. Section 2 gives detailed descriptions of the effects of noise that lead to the impact guidelines presented in section 1. Section 3 provides a description of the specific methods used to predict aircraft noise, including a detailed description of sonic booms.

1.0 NOISE DESCRIPTORS AND IMPACT

Aircraft operating in the Military Operations Areas (MOAs) and Warning Areas generate two types of sound. One is "subsonic" noise, which is continuous sound generated by the aircraft's engines and also by air flowing over the aircraft itself. The other is sonic booms (only in MOAs and Warning Areas authorized for supersonic), which are transient impulsive sounds generated during supersonic flight. These are quantified in different ways.

Section 1.1 describes the characteristics which are used to describe sound. Section 1.2 describes the specific noise metrics used for noise impact analysis. Section 1.3 describes how environmental impact and land use compatibility are judged in terms of these quantities.

1.1 QUANTIFYING SOUND

Measurement and perception of sound involve two basic physical characteristics: amplitude and frequency. Amplitude is a measure of the strength of the sound and is directly measured in terms of the pressure of a sound wave. Because sound pressure varies in time, various types of pressure averages are usually used. Frequency, commonly perceived as pitch, is the number of times per second the sound causes air molecules to oscillate. Frequency is measured in units of cycles per second, or hertz (Hz).

Amplitude. The loudest sounds the human ear can comfortably hear have acoustic energy one trillion times the acoustic energy of sounds the ear can barely detect. Because of this vast range, attempts to represent sound amplitude by pressure are generally unwieldy. Sound is, therefore, usually represented on a logarithmic scale with a unit called the decibel (dB). Sound on the decibel scale is referred to as a sound level. The threshold of human hearing is approximately 0 dB, and the threshold of discomfort or pain is around 120 dB.

Because of the logarithmic nature of the decibel scale, sounds levels do not add and subtract directly and are somewhat cumbersome to handle mathematically. However, some simple rules

of thumb are useful in dealing with sound levels. First, if a sound's intensity is doubled, the sound level increases by approximately 3 dB, regardless of the initial sound level. Thus, for example:

60 dB + 60 dB = 63 dB, and

80 dB + 80 dB = 83 dB.

The total sound level produced by two sounds of different levels is usually only slightly more than the higher of the two. For example:

60.0 dB + 70.0 dB = 70.4 dB.

Because the addition of sound levels behaves differently than that of ordinary numbers, such addition is often referred to as "decibel addition" or "energy addition." The latter term arises from the fact that combination of decibel values consists of first converting each decibel value to its corresponding acoustic energy, then adding the energies using the normal rules of addition, and finally converting the total energy back to its decibel equivalent.

The difference in dB between two sounds represents the ratio of the amplitudes of those two sounds. Because human senses tend to be proportional (i.e., detect whether one sound is twice as big as another) rather than absolute (i.e., detect whether one sound is a given number of pressure units bigger than another), the decibel scale correlates well with human response.

Under laboratory conditions, differences in sound level of 1 dB can be detected by the human ear. In the community, the smallest change in average noise level that can be detected is about 3 dB. A change in sound level of about 10 dB is usually perceived by the average person as a doubling (or halving) of the sound's loudness, and this relation holds true for loud sounds and for quieter sounds. A decrease in sound level of 10 dB actually represents a 90 percent decrease in sound intensity but only a 50 percent decrease in perceived loudness because of the nonlinear response of the human ear (similar to most human senses).

The one exception to the exclusive use of levels, rather than physical pressure units, to quantify sound is in the case of sonic booms. As described in Section 3, sonic booms are coherent waves with specific characteristics. There is a long-standing tradition of describing individual sonic booms by the amplitude of the shock waves, in pounds per square foot (psf). This is particularly relevant when assessing structural effects as opposed to loudness or cumulative community response. In this study, sonic booms are quantified by either dB or psf, as appropriate for the particular impact being assessed.

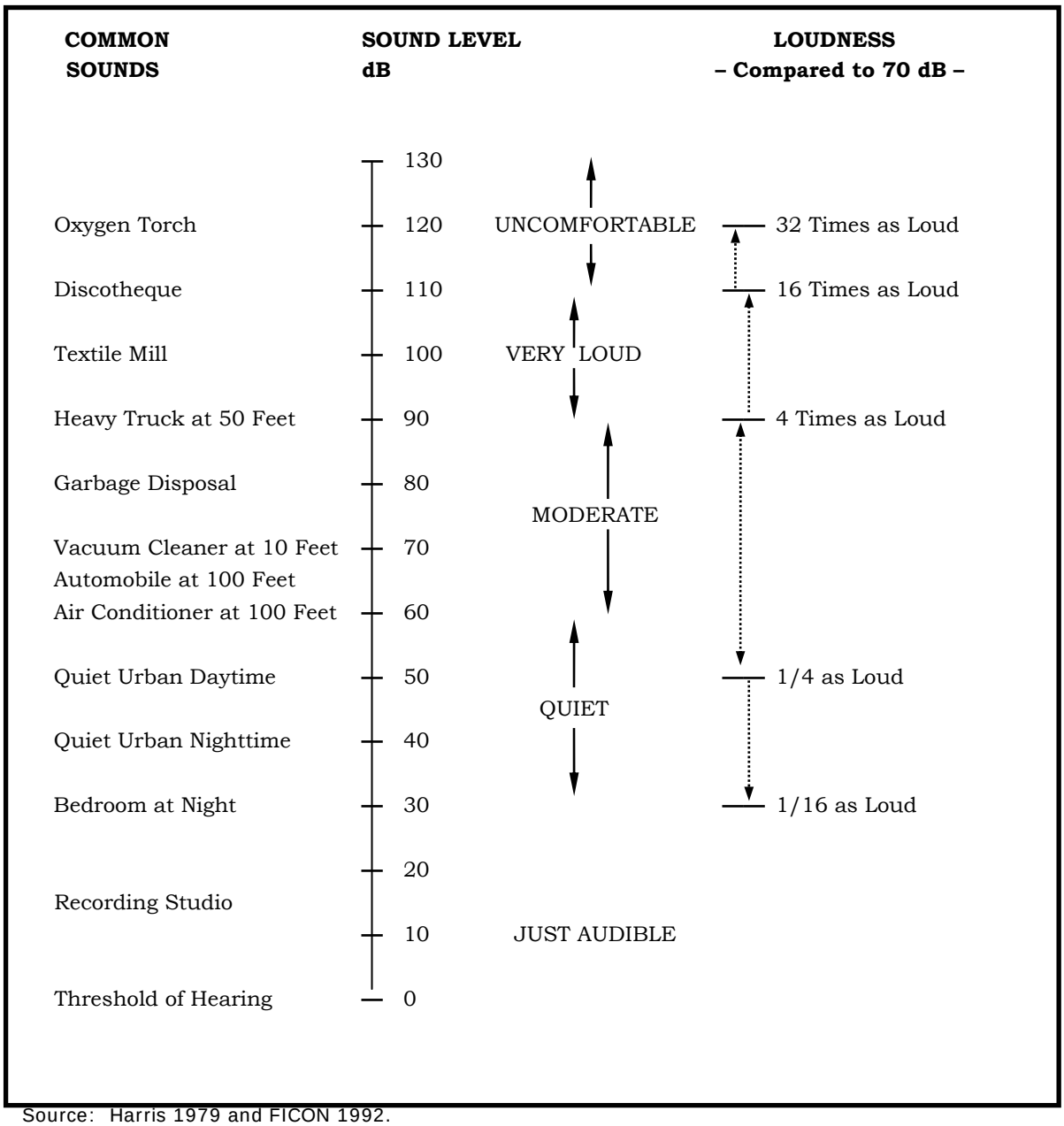
Frequency. The normal human ear can hear frequencies from about 20 Hz to about 20,000 Hz. It is most sensitive to sounds in the 1,000 to 4,000 Hz range. When measuring community

response to noise, it is common to adjust the frequency content of the measured sound to correspond to the frequency sensitivity of the human ear. This adjustment is called A-weighting (ANSI 1988). Sound levels that have been so adjusted are referred to as A-weighted sound levels. The amplitude of A-weighted sound levels is measured in dB. It is common for some noise analysts to denote the unit of A-weighted sounds by dBA. As long as the use of A-weighting is understood, there is no difference between dB or dBA: it is only important that the use of A-weighting be made clear. In this study, sound levels are reported in dB and are A-weighted unless otherwise specified.

A-weighting is appropriate for continuous sounds, which are perceived by the ear. Impulsive sounds, such as thunder or sonic booms, are perceived by more than just the ear. When experienced indoors, there can be secondary noise from rattling of the building. Vibrations may also be felt. C-weighting (ANSI 1988) is applied to such sounds. This is a frequency weighting that is flat over the range of human hearing (about 20 Hz to 20,000 Hz) and rolls off above and below that range. In this study, C-weighted sound levels are used for the assessment of sonic booms and other impulsive sounds. As with A-weighting, the unit is dB, but dBC is sometimes used for clarity. In this study, sound levels are reported in dB. C-weighting is not included because ATI does not proposed supersonic flight below the currently approved FL 300 or above 30,000 feet MSL. Shaw AFB and McEntire ANGS pilots have access to offshore warning areas where lower altitude supersonic flight is authorized.

Time Averaging. Sound pressure of a continuous sound varies greatly with time, so it is customary to deal with sound levels that represent averages over time. Levels presented as instantaneous (i.e., as might be read from the dial of a sound level meter) are based on averages of sound energy over either 1/8 second (fast) or 1 second (slow). The formal definitions of fast and slow levels are somewhat complex, with details that are important to the makers and users of instrumentation. They may, however, be thought of as levels corresponding to the root-mean-square sound pressure measured over the 1/8-second or 1-second periods.

The most common uses of the fast or slow sound level in environmental analysis is in the discussion of the maximum sound level that occurs from the action, and in discussions of typical sound levels. Figure C-1 is a chart of A-weighted sound levels from typical sounds. Some (air conditioner, vacuum cleaner) are continuous sounds whose levels are constant for some time. Some (automobile, heavy truck) are the maximum sound during a vehicle passby. Some (urban daytime, urban nighttime) are averages over some extended period. A variety of noise metrics have been developed to describe noise over different time periods. These are described in section 1.2.



Source: Harris 1979 and FICON 1992.

Figure C-1. Typical A-Weighted Sound Levels of Common Sounds

1.2 NOISE METRICS

MAXIMUM SOUND LEVEL

The highest A-weighted sound level measured during a single event in which the sound level changes value as time goes on (e.g., an aircraft overflight) is called the maximum A-weighted sound level or maximum sound level, for short. It is usually abbreviated by ALM, L_{max}, or L_{Amax}. The maximum sound level is important in judging the interference caused by a noise event with conversation, TV or radio listening, sleeping, or other common activities.

PEAK SOUND LEVEL

For impulsive sounds, the true instantaneous sound pressure is of interest. For sonic booms, this is the peak pressure of the shock wave, as described in section 3.2 of this appendix. This pressure is usually presented in physical units of pounds per square foot. Sometimes it is represented on the decibel scale, with symbol L_{pk}. Peak sound levels do not use either A or C weighting.

SOUND EXPOSURE LEVEL

Individual time-varying noise events have two main characteristics: a sound level that changes throughout the event and a period of time during which the event is heard. Although the maximum sound level, described above, provides some measure of the intrusiveness of the event, it alone does not completely describe the total event. The period of time during which the sound is heard is also significant. The Sound Exposure Level (abbreviated SEL or L_{AE} for A-weighted sounds) combines both of these characteristics into a single metric.

SEL is a composite metric that represents both the intensity of a sound and its duration. Mathematically, the mean square sound pressure is computed over the duration of the event, then multiplied by the duration in seconds, and the resultant product is turned into a sound level. It does not directly represent the sound level heard at any given time, but rather provides a measure of the net impact of the entire acoustic event. It has been well established in the scientific community that SEL measures this impact much more reliably than just the maximum sound level.

Because the SEL and the maximum sound level are both used to describe single events, there is sometimes confusion between the two, so the specific metric used should be clearly stated.

SEL can be computed for C-weighted levels (appropriate for impulsive sounds), and the results denoted CSEL or L_{CE}. SEL for A-weighted sound is sometimes denoted ASEL. Within this study, SEL is used for A-weighted sounds and CSEL for C-weighted.

EQUIVALENT SOUND LEVEL

For longer periods of time, total sound is represented by the equivalent continuous sound pressure level (L_{eq}). L_{eq} is the average sound level over some time period (often an hour or a day, but any explicit time span can be specified), with the averaging being done on the same energy basis as used for SEL. SEL and L_{eq} are closely related, differing by (a) whether they are applied over a specific time period or over an event, and (b) whether the duration of the event is included or divided out.

Just as SEL has proven to be a good measure of the noise impact of a single event, L_{eq} has been established to be a good measure of the impact of a series of events during a given time period. Also, while L_{eq} is defined as an average, it is effectively a sum over that time period and is, thus, a measure of the cumulative impact of noise.

DAY-NIGHT AVERAGE SOUND LEVEL

Noise tends to be more intrusive at night than during the day. This effect is accounted for by applying a 10-dB penalty to events that occur after 10 pm and before 7 am. If L_{eq} is computed over a 24-hour period with this nighttime penalty applied, the result is the day-night average sound level (DNL or L_{dn}). DNL is the community noise metric recommended by the USEPA (USEPA 1974) and has been adopted by most federal agencies (FICON 1992). It has been well established that DNL correlates well with community response to noise (Schultz 1978; Finegold *et al.* 1994). This correlation is presented in Section 1.3 of this appendix.

While DNL carries the nomenclature "average," it incorporates all of the noise at a given location. For this reason, DNL is often referred to as a "cumulative" metric. It accounts for the total, or cumulative, noise impact.

It was noted earlier that, for impulsive sounds, C-weighting is more appropriate than A-weighting. The day-night average sound level can be computed for C-weighted noise and is denoted CDNL or L_{Cdn}. This procedure has been standardized, and impact interpretive criteria similar to those for DNL have been developed (CHABA 1981).

ONSET-ADJUSTED MONTHLY DAY-NIGHT AVERAGE SOUND LEVEL

Aircraft operations in military airspace, such as MOAs and Warning Areas, generate a noise environment somewhat different from other community noise environments. Overflights are sporadic, occurring at random times and varying from day to day and week to week. This situation differs from most community noise environments, in which noise tends to be continuous or patterned. Individual military overflight events also differ from typical community noise events in that noise from a low-altitude, high-airspeed flyover can have a rather sudden onset.

To represent these differences, the conventional DNL metric is adjusted to account for the "surprise" effect of the sudden onset of aircraft noise events on humans (Plotkin *et al.* 1987; Stusnick *et al.* 1992; Stusnick *et al.* 1993). For aircraft exhibiting a rate of increase in sound level (called onset rate) of from 15 to 150 dB per second, an adjustment or penalty ranging from 0 to 11 dB is added to the normal SEL. Onset rates above 150 dB per second require an 11 dB penalty, while onset rates below 15 dB per second require no adjustment. The DNL is then determined in the same manner as for conventional aircraft noise events and is designated as Onset-Rate Adjusted Day-Night Average Sound Level (abbreviated L_{dnmr}). Because of the irregular occurrences of aircraft operations, the number of average daily operations is determined by using the calendar month with the highest number of operations. The monthly average is denoted L_{dnmr}. Noise levels are calculated the same way for both DNL and L_{dnmr}. L_{dnmr} is interpreted by the same criteria as used for DNL.

1.3 NOISE IMPACT

COMMUNITY REACTION

Studies of community annoyance to numerous types of environmental noise show that DNL correlates well with impact. Schultz (1978) showed a consistent relationship between DNL and annoyance. Shultz's original curve fit (Figure C-2) shows that there is a remarkable consistency in results of attitudinal surveys which relate the percentages of groups of people who express various degrees of annoyance when exposed to different DNLs.

A more recent study has reaffirmed this relationship (Fidell *et al.* 1991). Figure C-3 (FICON 1992) shows an updated form of the curve fit (Finegold *et al.* 1994) in comparison with the original. The updated fit, which does not differ substantially from the original, is the current preferred form. In general, correlation coefficients of 0.85 to 0.95 are found between the percentages of groups of people highly annoyed and the level of average noise exposure. The correlation coefficients for the annoyance of individuals are relatively low, however, on the order of 0.5 or less. This is not surprising, considering the varying personal factors that influence the manner in which individuals react to noise. Nevertheless, findings substantiate that community annoyance to aircraft noise is represented quite reliably using DNL.

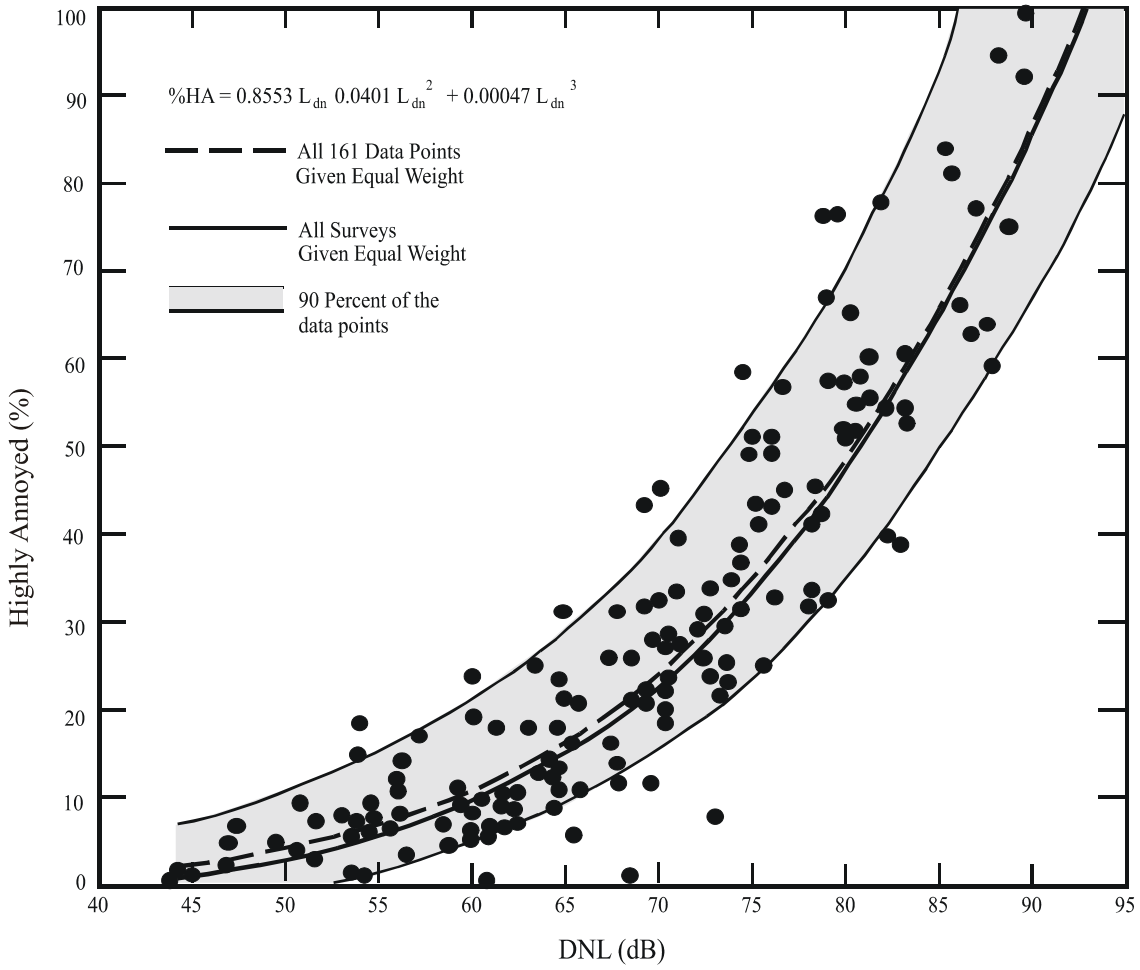
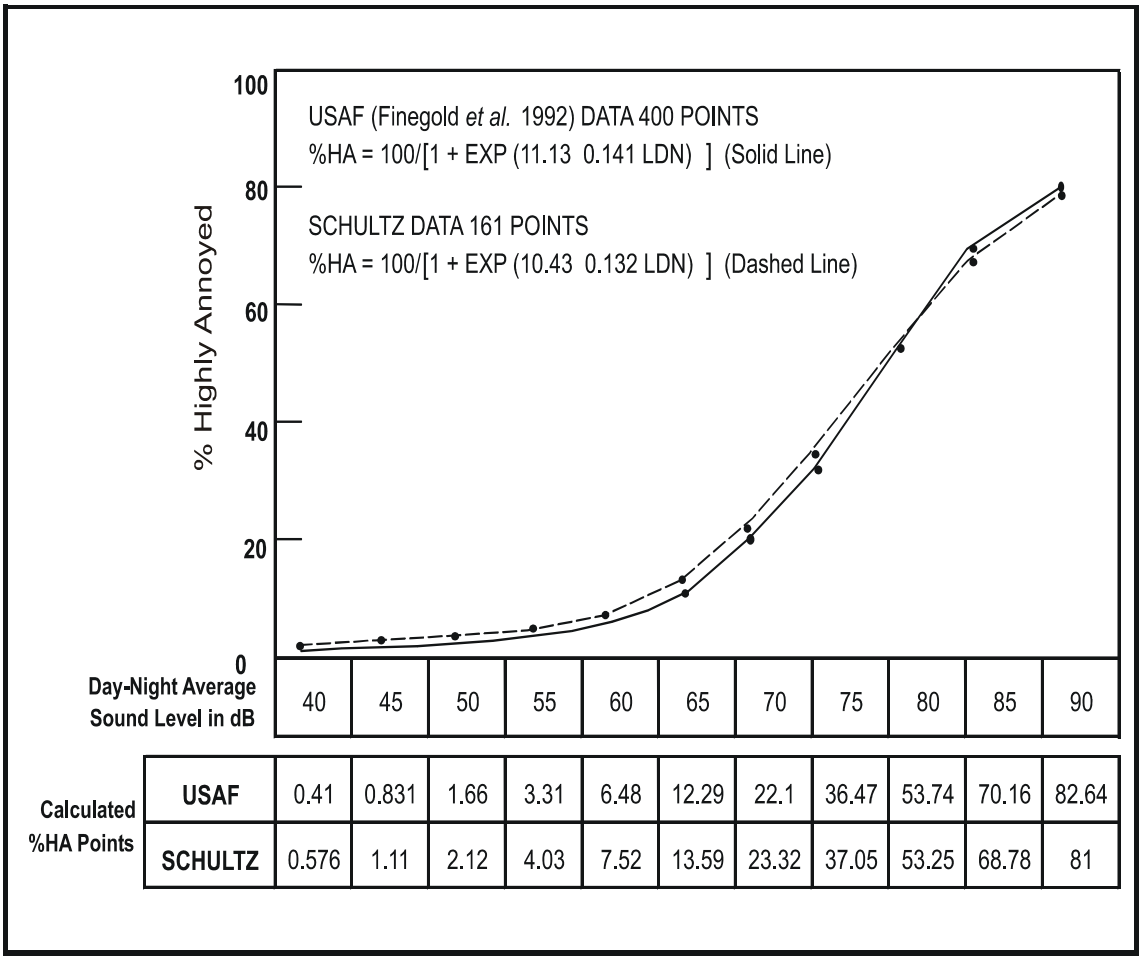


Figure C-2. Community Surveys of Noise Annoyance
(Source: Schultz 1978)



Calculated %HA Points											
	USAF	0.41	0.831	1.66	3.31	6.48	12.29	22.1	36.47	53.74	70.16	82.64
	SCHULTZ	0.576	1.11	2.12	4.03	7.52	13.59	23.32	37.05	53.25	68.78	81

Figure C-3. Response of Communities to Noise; Comparison of Original (Schultz 1978) and Current (Finegold et al. 1994) Curve Fits.

As noted earlier for SEL, DNL does not represent the sound level heard at any particular time, but rather represents the total sound exposure. DNL accounts for the sound level of individual noise events, the duration of those events, and the number of events. Its use is endorsed by the scientific community (ANSI 1980; ANSI 1988; USEPA 1974; FICUN 1980; FICON 1992).

While DNL is the best metric for quantitatively assessing cumulative noise impact, it does not lend itself to intuitive interpretation by non-experts. Accordingly, it is common for environmental noise analyses to include other metrics for illustrative purposes. A general indication of the noise environment can be presented by noting the maximum sound levels which can occur and the number of times per day noise events will be loud enough to be heard. Use of other metrics as supplements to DNL has been endorsed by federal agencies (FICON 1992).

The Schultz curve is generally applied to annual average DNL. In Section 1.2, L_{dnmr} was described and presented as being appropriate for quantifying noise in military airspace. In the current study, the Schultz curve is used with L_{dnmr} as the noise metric. L_{dnmr} is always equal to or greater than DNL, so impact is generally higher than would have been predicted if the onset rate and busiest-month adjustments were not accounted for.

There are several points of interest in the noise-annoyance relation. The first is DNL of 65 dB. This is a level most commonly used for noise planning purposes and represents a compromise between community impact and the need for activities like aviation which do cause noise. Areas exposed to DNL above 65 dB are generally not considered suitable for residential use. The second is DNL of 55 dB, which was identified by USEPA as a level "...requisite to protect the public health and welfare with an adequate margin of safety," (USEPA 1974) which is essentially a level below which adverse impact is not expected. The third is DNL of 75 dB. This is the lowest level at which adverse health effects could be credible (USEPA 1974). The very high annoyance levels correlated with DNL of 75 dB make such areas unsuitable for residential land use.

Sonic boom exposure is measured by C-weighting, with the corresponding cumulative metric being CDNL. Correlation between CDNL and annoyance has been established, based on community reaction to impulsive sounds (CHABA 1981). Values of the C-weighted equivalent to the Schultz curve are different than that of the Schultz curve itself. Table C-1 shows the relation between annoyance, DNL, and CDNL.

Table C-1. Relation Between Annoyance, DNL and CDNL

CDNL	*% Highly Annoyed*	*DNL*
48	2	50
52	4	55
57	8	60
61	14	65
65	23	70
69	35	75

Interpretation of CDNL from impulsive noise is accomplished by using the CDNL versus annoyance values in Table F-1. CDNL can be interpreted in terms of an "equivalent annoyance" DNL. For example, CDNL of 52, 61, and 69 dB are equivalent to DNL of 55, 65, and 75 dB, respectively. If both continuous and impulsive noise occurs in the same area, impacts are assessed separately for each.

LAND USE COMPATIBILITY

As noted above, the inherent variability between individuals makes it impossible to predict accurately how any individual will react to a given noise event. Nevertheless, when a community is considered as a whole, its overall reaction to noise can be represented with a high degree of confidence. As described above, the best noise exposure metric for this correlation is the DNL or L_{dnmr} for military overflights. Impulsive noise can be assessed by relating CDNL to an "equivalent annoyance" DNL, as outlined in Section 1.3.1.

In June 1980, an ad hoc Federal Interagency Committee on Urban Noise (FICUN) published guidelines (FICUN 1980) relating DNL to compatible land uses. This committee was composed of representatives from DoD, Transportation, and Housing and Urban Development; USEPA; and the Veterans Administration. Since the issuance of these guidelines, federal agencies have generally adopted these guidelines for their noise analyses.

Following the lead of the committee, DoD and FAA adopted the concept of land-use compatibility as the accepted measure of aircraft noise effect. The FAA included the committee's guidelines in the Federal Aviation Regulations (USDOT 1984). These guidelines are reprinted in Table C-2, along with the explanatory notes included in the regulation. Although these guidelines are not mandatory (note the footnote "*" in the table), they provide the best means for determining noise impact in airport communities. In general, residential land uses normally are not compatible with outdoor DNL values above 65 dB, and the extent of land areas and populations exposed to DNL of 65 dB and higher provides the best means for assessing the noise impacts of alternative aircraft actions. In some cases, where noise change exceeds 3 dB, the 1992 FICON indicates the 60 dB DNL may be a more appropriate incompatibility level for densely populated areas.

Table C-2. Land-Use Compatibility With Yearly Day-Night Average Sound Levels

LAND USE	Yearly Day-Night Average Sound Level (DNL) in Decibels					
	Below 65	**65–70**	**70–75**	**75–80**	**80–85**	**Over 85**
RESIDENTIAL						
Residential, other than mobile homes and transient lodgings	Y	N(1)	N(1)	N	N	N
Mobile home parks	Y	N	N	N	N	N
Transient lodgings	Y	N(1)	N(1)	N(1)	N	N
PUBLIC USE						
Schools	Y	N(1)	N(1)	N	**N**	**N**
Hospitals and nursing homes	Y	25	30	N	N	N
Churches, auditoria, and concert halls	Y	25	30	N	N	N
Government services	Y	Y	25	30	N	N
Transportation	Y	Y	Y(2)	Y(3)	Y(4)	Y(4)
Parking	Y	Y	Y(2)	Y(3)	Y(4)	N
COMMERCIAL USE						
Offices, business and professional	Y	Y	25	30	N	N
Wholesale and retail—building materials, hardware, and farm equipment	Y	Y	Y(2)	Y(3)	Y(4)	N
Retail trade—general	Y	Y	25	30	N	N
Utilities	Y	Y	Y(2)	Y(3)	Y(4)	N
Communication	Y	Y	25	30	N	N
MANUFACTURING AND PRODUCTION						
Manufacturing, general	Y	Y	Y(2)	Y(3)	Y(4)	N
Photographic and optical	Y	Y	25	30	N	N
Agriculture (except livestock) and forestry	Y	Y(6)	Y(7)	Y(8)	Y(8)	Y(8)
Livestock farming and breeding	Y	Y(6)	Y(7)	N	N	N
Mining and fishing, resource production and extraction	Y	Y	Y	Y	Y	Y
RECREATIONAL						
Outdoor sports arenas and spectator sports	Y	Y(5)	Y(5)	N	N	N
Outdoor music shells, amphitheaters	Y	N	N	N	N	N
Nature exhibits and zoos	Y	Y	N	N	N	N
Amusements, parks, resorts, and camps	Y	Y	Y	N	N	N
Golf courses, riding stables, and water recreation	Y	Y	25	30	N	N

Numbers in parentheses refer to notes.

* The designations contained in this table do not constitute a federal determination that any use of land covered by the program is acceptable or unacceptable under federal, state, or local law. The responsibility for determining the acceptable and permissible land uses and the relationship between specific properties and specific noise contours rests with the local authorities. FAA determinations under Part 150 are not intended to substitute federally determined land uses for those determined to be appropriate by local authorities in response to locally determined needs and values in achieving noise-compatible land uses.

KEY TO TABLE F-2

Y (YES) = Land Use and related structures compatible without restrictions.

N (No) = Land Use and related structures are not compatible and should be prohibited.

NLR = Noise Level Reduction (outdoor to indoor) to be achieved through incorporation of noise attenuation into the design and construction of the structure.

25, 30, or 35 = Land Use and related structures generally compatible; measures to achieve NLR of 25, 30, or 35 dB must be incorporated into design and construction of structures.

NOTES FOR TABLE F-2

(1) Where the community determines that residential or school uses must be allowed, measures to achieve outdoor-to-indoor Noise Level Reduction (NLR) of at least 25 dB and 30 dB should be incorporated into building codes and be considered in individual approvals. Normal residential construction can be expected to provide an NLR of 20 dB; thus the reduction requirements are often stated as 5, 10, or 15 dB over standard construction and normally assume mechanical ventilation and closed windows year-round. However, the use of NLR criteria will not eliminate outdoor noise problems.

(2) Measures to achieve NLR 25 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise-sensitive areas, or where the normal noise level is low.

(3) Measures to achieve NLR 30 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise-sensitive areas, or where the normal noise level is low.

(4) Measures to achieve NLR 35 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise-sensitive areas, or where the normal noise level is low.

(5) Land-use compatible provided special sound reinforcement systems are installed.

(6) Residential buildings require an NLR of 25.

(7) Residential buildings require an NLR of 30.

(8) Residential buildings not permitted.

2.0 NOISE EFFECTS

The discussion in Section 1.3 presents the global effect of noise on communities. The following sections describe particular noise effects.

2.1 HEARING LOSS

Noise-induced hearing loss is probably the best defined of the potential effects of human exposure to excessive noise. Federal workplace standards for protection from hearing loss allow a time-average level of 90 dB over an 8-hour work period, or 85 dB averaged over a 16-hour period. Even the most protective criterion (no measurable hearing loss for the most sensitive portion of the population at the ear's most sensitive frequency, 4,000 Hz, after a 40-year exposure) suggests a time-average sound level of 70 dB over a 24-hour period (USEPA 1974). Since it is unlikely that airport neighbors will remain outside their homes 24 hours per day for extended periods of time, there is little possibility of hearing loss below a DNL of 75 dB, and this level is extremely conservative.

2.2 NONAUDITORY HEALTH EFFECTS

Nonauditory health effects of long-term noise exposure, where noise may act as a risk factor, have not been found to occur at levels below those protective against noise-induced hearing loss, described above. Most studies attempting to clarify such health effects have found that noise exposure levels established for hearing protection will also protect against any potential nonauditory health effects, at least in workplace conditions. The best scientific summary of these findings is contained in the lead paper at the National Institutes of Health Conference on Noise and Hearing Loss, held on January 22–24, 1990, in Washington, D.C., which states "The nonauditory effects of chronic noise exposure, when noise is suspected to act as one of the risk factors in the development of hypertension, cardiovascular disease, and other nervous disorders, have never been proven to occur as chronic manifestations at levels below these criteria (an average of 75 dBA for complete protection against hearing loss for an eight-hour day)" (von Gierke 1990; parenthetical wording added for clarification). At the International Congress (1988) on Noise as a Public Health Problem, most studies attempting to clarify such health effects did not find them at levels below the criteria protective of noise-induced hearing loss; and even above these criteria, results regarding such health effects were ambiguous.

Consequently, it can be concluded that establishing and enforcing exposure levels protecting against noise-induced hearing loss would not only solve the noise-induced hearing loss problem but also any potential nonauditory health effects in the work place.

Although these findings were directed specifically at noise effects in the work place, they are equally applicable to aircraft noise effects in the community environment. Research studies regarding the nonauditory health effects of aircraft noise are ambiguous, at best, and often contradictory. Yet, even those studies which purport to find such health effects use time-average noise levels of 75 dB and higher for their research.

For example, in an often-quoted paper, two University of California at Los Angeles (UCLA) researchers found a relation between aircraft noise levels under the approach path to Los Angeles International Airport (LAX) and increased mortality rates among the exposed residents by using an average noise exposure level greater than 75 dB for the "noise-exposed" population (Meecham and Shaw 1979). Nevertheless, three other UCLA professors analyzed those same data and found no relation between noise exposure and mortality rates (Frerichs *et al*. 1980).

As a second example, two other UCLA researchers used this same population near LAX to show a higher rate of birth defects during the period of 1970 to 1972 when compared with a control group residing away from the airport (Jones and Tauscher 1978). Based on this report, a separate group at the United States Centers for Disease Control performed a more thorough study of populations near Atlanta's Hartsfield International Airport for 1970 to 1972 and found no relation in their study of 17 identified categories of birth defects to aircraft noise levels above 65 dB (Edmonds 1979).

A recent review of health effects, prepared by a Committee of the Health Council of The Netherlands (CHCN 1996), analyzed currently available published information on this topic. The committee concluded that the threshold for possible long-term health effects was a 16-hour (6:00 am to 10:00 pm) L_{eq} of 70 dB. Projecting this to 24 hours and applying the 10 dB nighttime penalty used with DNL, this corresponds to DNL of about 75 dB. The study also affirmed the risk threshold for hearing loss, as discussed earlier.

In summary, there is no scientific basis for a claim that potential health effects exist for aircraft time-average sound levels below 75 dB.

2.3 ANNOYANCE

The primary effect of aircraft noise on exposed communities is one of annoyance. Noise annoyance is defined by the USEPA as any negative subjective reaction on the part of an individual or group (USEPA 1974). As noted in the discussion of DNL above, community annoyance is best measured by that metric.

Because the USEPA Levels Document (USEPA 1974) identified DNL of 55 dB as ". . . requisite to protect public health and welfare with an adequate margin of safety," it is commonly assumed that 55 dB should be adopted as a criterion for community noise analysis. However, financial

and technical resources are generally not available to achieve that goal. Most agencies have identified DNL of 65 dB as a criterion which protects those most impacted by noise, and which can often be achieved on a practical basis (FICON 1992). This corresponds to about 13 percent of the exposed population being highly annoyed.

Although DNL of 65 dB is widely used as a benchmark for significant noise impact, and is often an acceptable compromise, it is not a statutory limit, and it is appropriate to consider other thresholds in particular cases.

In this Draft EIS, no specific threshold is used. The noise in the affected environment is evaluated on the basis of the information presented in this appendix and in the body of the Draft EIS.

2.4 SPEECH INTERFERENCE

Speech interference associated with aircraft noise is a primary cause of annoyance to individuals on the ground. The disruption of routine activities in the home, such as radio or television listening, telephone use, or family conversation, gives rise to frustration and irritation. The quality of speech communication is also important in classrooms, offices, and industrial settings and can cause fatigue and vocal strain in those who attempt to communicate over the noise. Research has shown that the use of the SEL metric will measure speech interference successfully, and that a SEL exceeding 65 dB will begin to interfere with speech communication.

2.5 SLEEP INTERFERENCE

Sleep interference is another source of annoyance associated with aircraft noise. This is especially true because of the intermittent nature and content of aircraft noise, which is more disturbing than continuous noise of equal energy and neutral meaning.

Sleep interference may be measured in either of two ways. "Arousal" represents actual awakening from sleep, while a change in "sleep stage" represents a shift from one of four sleep stages to another stage of lighter sleep without actual awakening. In general, arousal requires a somewhat higher noise level than does a change in sleep stage.

An analysis sponsored by the Air Force summarized 21 published studies concerning the effects of noise on sleep (Pearsons *et al*. 1989). The analysis concluded that a lack of reliable in-home studies, combined with large differences among the results from the various laboratory studies, did not permit development of an acceptably accurate assessment procedure. The noise events used in the laboratory studies and in contrived in-home studies were presented at much higher rates of occurrence than would normally be experienced. None of the laboratory studies were of sufficiently long duration to determine any effects of habituation, such as that which would occur

under normal community conditions. A recent extensive study of sleep interference in people's own homes (Ollerhead 1992) showed very little disturbance from aircraft noise.

There is some controversy associated with the recent studies, so a conservative approach should be taken in judging sleep interference. Based on older data, the USEPA identified an indoor DNL of 45 dB as necessary to protect against sleep interference (USEPA 1974). Assuming a very conservative structural noise insulation of 20 dB for typical dwelling units, this corresponds to an outdoor DNL of 65 dB as minimizing sleep interference.

A 1984 publication reviewed the probability of arousal or behavioral awakening in terms of SEL (Kryter 1984). Figure C-4, extracted from Figure 10.37 of Kryter (1984), indicates that an indoor SEL of 65 dB or lower should awaken less than 5 percent of those exposed. These results do not include any habituation over time by sleeping subjects. Nevertheless, this provides a reasonable guideline for assessing sleep interference and corresponds to similar guidance for speech interference, as noted above.

2.6 Noise Effects on Domestic Animals and Wildlife

Animal species differ greatly in their responses to noise. Each species has adapted, physically and behaviorally, to fill its ecological role in nature, and its hearing ability usually reflects that role. Animals rely on their hearing to avoid predators, obtain food, and communicate with and attract other members of their species. Aircraft noise may mask or interfere with these functions. Secondary effects may include nonauditory effects similar to those exhibited by humans: stress, hypertension, and other nervous disorders. Tertiary effects may include interference with mating and resultant population declines.

2.7 Noise Effects on Structures

Normally, the most sensitive components of a structure to airborne noise are the windows and, infrequently, the plastered walls and ceilings. An evaluation of the peak sound pressures impinging on the structure is normally sufficient to determine the possibility of damage. In general, at sound levels above 130 dB, there is the possibility of the excitation of structural component resonance. While certain frequencies (such as 30 Hz for window breakage) may be of more concern than other frequencies, conservatively, only sounds lasting more than one second above a sound level of 130 dB are potentially damaging to structural components (NRC/NAS 1977).

A study directed specifically at low-altitude, high-speed aircraft showed that there is little probability of structural damage from such operations (Sutherland 1989). One finding in that study is that sound levels at damaging frequencies (e.g., 30 Hz for window breakage or 15 to 25 Hz for whole-house response) are rarely above 130 dB.

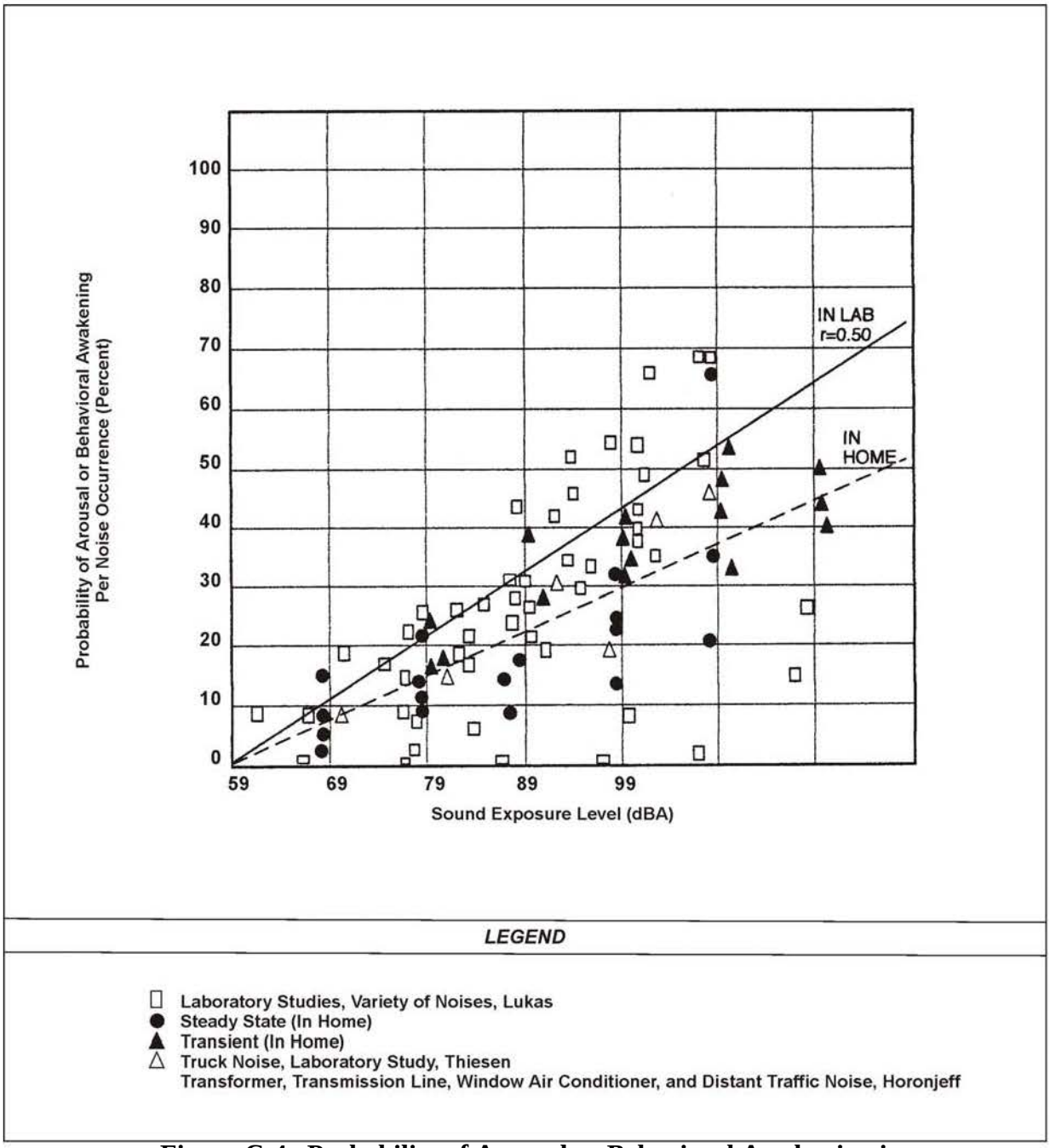


Figure C-4. Probability of Arousal or Behavioral Awakening in Terms of Sound Exposure Level

Noise-induced structural vibration may also cause annoyance to dwelling occupants because of induced secondary vibrations, or "rattle," of objects within the dwelling, such as hanging pictures, dishes, plaques, and bric-a-brac. Window panes may also vibrate noticeably when exposed to high levels of airborne noise, causing homeowners to fear breakage. In general, such noise-induced vibrations occur at sound levels above those considered normally incompatible with residential land use. Thus assessments of noise exposure levels for compatible land use should also be protective of noise-induced secondary vibrations.

2.8 NOISE EFFECTS ON TERRAIN

Members of the public often believe that noise from low-flying aircraft can cause avalanches or landslides by disturbing fragile soil or snow structures in mountainous areas. There are no known instances of such effects, and it is considered improbable that such effects will result from routine, subsonic aircraft operations**.**

2.9 NOISE EFFECTS ON HISTORICAL AND ARCHAEOLOGICAL SITES

Because of the potential for increased fragility of structural components of historical buildings and other historical sites, aircraft noise may affect such sites more severely than newer, modern structures. Again, there are few scientific studies of such effects to provide guidance for their assessment.

One study involved the measurements of sound levels and structural vibration levels in a superbly restored plantation house, originally built in 1795, and now situated approximately 1,500 feet from the centerline at the departure end of Runway 19L at Washington Dulles International Airport. These measurements were made in connection with the proposed scheduled operation of the supersonic Concorde airplane at Dulles (Wesler 1977). There was special concern for the building's windows, since roughly half of the 324 panes were original. No instances of structural damage were found. Interestingly, despite the high levels of noise during Concorde takeoffs, the induced structural vibration levels were actually less than those induced by touring groups and vacuum cleaning within the building itself.

As noted above for the noise effects of noise-induced vibrations on normal structures, assessments of noise exposure levels for normally compatible land uses should also be protective of historic and archaeological sites.

3.0 NOISE MODELING

An aircraft in subsonic flight generally emits noise from two sources: the engines and flow noise around the airframe. Noise generation mechanisms are complex and, in practical models, the noise sources must be based on measured data. The Air Force has developed a series of

computer models and aircraft noise databases for this purpose. The models include NOISEMAP (Moulton 1992) for noise around airbases, ROUTEMAP (Lucas and Plotkin 1988) for noise associated with low-level training routes, and MR_NMAP (Lucas and Calamia 1996) for use in MOAs and ranges. These models use the NOISEFILE database developed by the Air Force. NOISEFILE data includes SEL and L_{Amax} as a function of speed and power setting for aircraft in straight flight.

Noise from an individual aircraft is a time-varying continuous sound. It is first audible as the aircraft approaches, increases to a maximum when the aircraft is near its closest point, then diminishes as it departs. The noise depends on the speed and power setting of the aircraft and its trajectory. The models noted above divide the trajectory into segments whose noise can be computed from the data in NOISEFILE. The contributions from these segments are summed.

MR_NMAP was used to compute noise levels in the airspace. The primary noise metric computed by MR_NMAP was L_{dnmr} averaged over each airspace. Supporting routines from NOISEMAP were used to calculate SEL and L_{Amax} for various flight altitudes and lateral offsets from a ground receiver position.

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LOS	Level of Service
LRF	Little Rock AFB Control Tower
LZ	Landing Zone
MFH	Military Family Housing
mgd	million gallons per day
MOA	Military Operations Area
MPH	miles per hour
MSL	mean sea level
MTF	Maintenance Training Facility
MTR	Military Training Route
MWS	Mobility Weapons School
MXS	Maintenance Squadron
NAAQS	National Ambient Air Quality Standards
NAGPRA	Native American Graves Protection and Repatriation Act
NAS	National Audubon Society
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NM	nautical mile
NO_2	nitrogen dioxide
NOTAM	Notice to Airmen
NO_x	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
O_3	ozone
P.L.	Public Law
PAI	Primary Aircraft Inventory
Pb	lead
PIF	Partners in Flight
PM_{10}	particulate matter less than or equal to 10 micrometers in diameter
$PM_{2.5}$	particulate matter less than or equal to 2.5 micrometers in diameter
PMEL	Precision Measurement Equipment Laboratory
POV	privately-owned vehicle
ppm	parts per million
PSD	Prevention of Significant Deterioration
RAPCON	radar approach control
RCRA	Resource Conservation and Recovery Act
ROI	region of influence
SARA	Superfund Amendments and Reauthorization Act
SEL	Sound Exposure Level
SF	square feet
SHPO	State Historic Preservation Officer
SIP	State Implementation Plan
SO_2	sulfur dioxide
SO_x	sulfur oxides
SR	Slow-speed Training Route
SUA	Special Use Airspace
SWDA	Solid Waste Disposal Act
SWPPP	Storm Water Pollution Prevention Plan
TLF	Temporary Lodging Facility
TPY	tons per year
U.S.	United States
UFC	Unified Facilities Criteria
USACE	United States Army Corps of Engineers
USAF	United States Air Force
USC	United States Code
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USMC	United States Marine Corps
UST	underground storage tank
VFR	Visual Flight Rule
VOC	volatile organic compound
VORTAC	very high frequency omni range tactical air navigation
WARFIT	War Fitness
ZME	Memphis ARTCC